STRS OHIO

Fiscal 2023
Investment Plan

June 16, 2022

Table of Contents

1. Purpose ... 1

2. Fiscal 2023 Investment Plan Overview ... 2

Forecast in Brief ... 2

Economic Overview ... 2

Total Fund Outlook ... 3

Investment Plan Themes ... 4

3. Asset Allocation/Risk/ERM Matrix ... 5

Risk Budget ... 6

4. Fiscal 2023 Economic Outlook ... 9

U.S. Economic Growth and Inflation Outlook ... 9

U.S. Economic Forecast Summary ... 14

International Economic Growth and Inflation Outlook ... 15

International Forecasts ... 18

5. Fixed Income Investments ... 19

Outlook ... 19

Strategy ... 21

6. Domestic Equities Investments ... 24

Outlook ... 24

Strategy ... 29

7. International Investments ... 30

Outlook ... 30

Strategy ... 33

8. Real Estate Investments ... 35

Outlook ... 35

Strategy ... 39

9. Alternative Investments ... 45

Private Equity Outlook ... 46

Private Equity Strategy ... 46

Opportunistic/Diversified Outlook ... 47

Opportunistic/Diversified Strategy ... 47

1. Purpose

The Investment Plan provides the fiscal 2023 outlook and strategy for the asset classes and total fund based on the State Teachers Retirement Board's long-term objectives and the forecasted capital market environment. Because the staff forecast is based on estimates of future economic conditions and returns, updates or modifications to the plan may be necessary. This will be communicated to the Retirement Board during the upcoming fiscal year as appropriate.

2. Fiscal 2023 Investment Plan Overview

FORECAST IN BRIEF		
	Fiscal 2023 Projected Ranges	Fiscal 2022 Forecast
Real Gross Domestic Product	1.5%–3.0%	2.4%
Real Personal Consumption	1.25%–2.75%	2.4%
Real Business Fixed Investment	(2.5%)–7.5%	5.3%
Housing Starts (millions)	1.45–1.65	1.665
Real Net Exports (billions)	($1540)–($1480)	($1437.5)
Consumer Price Index Ex Food & Energy	2.0%–3.5%	5.8%
S&P 500 Earnings	$235 9.3%	$215 22.2%
	Fiscal 2023 Projected Ranges	End of April 2022
Federal Funds Target Rate	1.00%–3.75%	0.375%
10-Year Treasury Note Yield	1.75%–4.00%	2.900%

ECONOMIC OVERVIEW

With the COVID-19 pandemic easing to acceptable conditions across most of the globe, economic activity in the United States and elsewhere is being shaped by fundamental cyclical forces and a change in government policies. Global supply chain problems remain after the reopening of economies around the world and the significant manufacturing shutdown in key areas of China where COVID-19 cases have surged. This ongoing mismatch of solid demand from primarily robust fiscal and monetary policy stimulus and constrained materials and labor supply in many areas of the economy has triggered unacceptable inflation throughout the world. Now that pandemic threats have diminished, those stimulative policies are beginning to retreat and significantly more moderate economic growth with slower price inflation should appear in fiscal 2023. The abrupt switch from overly stimulative policies that helped the global economy survive the pandemic to, perhaps, overly contractionary ones to battle unwanted inflation is raising recession risks around the globe. The Russian invasion of Ukraine and danger that poses to global energy and food prices also increases recession risks for certain countries. However, for fiscal 2023, the bulk of the world should progress near a long-term trend pace, likely pushing more worrisome recession risks beyond the upcoming fiscal year.

For the United States and elsewhere, here are some of the key points to the STRS Ohio economic forecast:

- U.S. real GDP should grow around 2.4% in fiscal 2023, matching the fiscal 2022 growth rate that followed the massive 12.2% surge in fiscal 2021 after the COVID-19 recession. Private domestic final sales growth (GDP less volatile inventory changes, government spending and foreign trade) should grow a trend-like 2% after 2.6% growth in fiscal 2022 and the soaring 16% growth of fiscal 2021. Though the labor market should remain tight, consumer spending will likely ease from the strong pace of recent years as interest rates climb from historic lows. Business fixed investment should contribute notably to economic growth, but its pace will ease from the robust activity of the past two fiscal years. With higher interest rates from the pullback in monetary policy stimulus, residential investment should turn negative even with a shortage of available homes across the country. Housing affordability measures will continue to slide from higher interest rates, moderate income growth and the massive increase in home prices since the recession. Infrastructure spending from fiscal policy passed last year will marginally add to overall economic growth, but most of the added fiscal policy spending during the pandemic has already occurred. Monetary policy is headed to a more neutral stance by the end of calendar 2022 and will likely turn moderately restrictive before the end of fiscal 2023 to combat high inflation, while quantitative tightening of the Federal Reserve's balance sheet should be notable in the fiscal year.

- More broadly, in developed countries economic growth will moderate markedly from a pace that has been well above long-term trend growth rates in fiscal 2022 to only slightly above those rates in fiscal 2023. Growth will slow more in the eurozone than elsewhere due to the Russia invasion of Ukraine. Activity will be slower than fiscal 2022 among emerging countries as well. Due to its zero-COVID-19 policy, China's real GDP is expected to grow at a 4.2% annual rate — a pace closer to the lower end of its 4.0%–5.0% long-term growth range and about one percentage point slower than the government's 5.0%–5.5% growth target. Central banks in countries such as Brazil and Mexico have raised their policy interest rates significantly in fiscal 2022 and the effects of those rate hikes should moderate economic activity. Downside forecast risks are more prominent than upside ones.
- U.S. fiscal 2023 growth in the 1.5%–3.0% baseline range has about a 50% chance of occurring. Slow non-recessionary economic growth below that range and stronger growth above it each carry about a 15% chance of occurring, while recession risks have grown from about 10% to 20% since the time of the fiscal 2022 mid-year economic update. The baseline U.S. forecast of 2.4% real GDP growth and 3.1% GDP price index growth produces slower nominal activity of 5.5% compared to the Bloomberg weighted average consensus real GDP growth of 2.3% and the Blue Chip Economic Indicators GDP price index growth of 3.4% that gives a nominal growth rate of about 5.7%.

TOTAL FUND OUTLOOK

STRS Ohio investment assets are currently estimated at $91.6 billion as of the end of April 2022. Investment staff projects a base case scenario with a positive total fund return at the Retirement Board's policy return of 6.03%. The positive return and market environment we forecast should roughly offset the approximately $4 billion of net benefit payments (benefits and operating expenses less contributions) anticipated for fiscal 2023, resulting in a minimal change for the total investment assets.

The table below illustrates the expected annual market forecast for each asset class for fiscal 2023 relative to the Retirement Board's policy for expected average annual returns. The current fiscal 2022 total fund return will likely end the year with a return that is below the policy return, following a significantly above-average return for fiscal 2021. More importantly, the total fund return will likely finish with an above-average five-year return ending fiscal 2022. The total fund has earned a positive return in each year following fiscal 2009, this trend may continue in fiscal 2022, depending upon the final two months of the year.

ANTICIPATED MARKET RETURNS

	Board Policy Expected Average Annual Benchmark Returns	Benchmark Annualized Return Expectation for Fiscal 2023
Liquidity Reserves	1.00%	Above Normal
Fixed Income	1.75%	Above Normal
Domestic Equities	6.60%	Above Normal
International	6.80%	Below Normal
Real Estate	5.75%	At-to-Above Normal
Alternative Investments	7.38%	Normal
Total Fund	**6.03%**	**Normal**

Based upon market levels during mid-May 2022. Should market levels change significantly by late June 2022, an updated projection will be issued.

INVESTMENT PLAN THEMES

- *The U.S. economy is forecasted to grow at a real rate of 2.4% with inflation exceeding the Federal Reserve's target range. The baseline forecast of nominal GDP growth of 5.5% has a higher potential downside than upside reflecting the aggressive monetary policy response to persistent inflation. Against this backdrop economic growth and inflationary pressures are exacerbated by subsequent COVID-19 lockdowns and geopolitical risks leading to a range of economic outcomes.*

- *Asset prices reflect the distribution of outcomes in the economic forecast, while incorporating risk related to monetary policy, COVID-19 disruptions, and the current level of geopolitical risks. Furthermore, asset prices are incorporating higher interest rates and the risk inflation does not moderate over the next 12 months. The underlying fundamentals support valuations in each asset class. The fiscal 2022 total fund return has been below average, pricing in some recognition of the range of economic outcomes. Overall, we expect higher volatility punctuated by geopolitical, COVID-19 and inflation concerns leading to buying opportunities in the upcoming fiscal year. We expect a fiscal 2023 return that is at the board's long-term policy return of 6.03%.*

- *There is a change in two risk factors for the investment ERM matrix on Page 8 to recognize the recession risk and the level of inflation. We have reclassified "Recession" as a medium probability scenario but retained it in the medium financial impact. While we are forecasting normal economic growth during fiscal 2023 and assign a medium probability of recession, if a recession were to occur during the fiscal year and returns become negative, then this would have a more negative impact on the funded status of the plan and require moving this risk factor to the high financial impact category. Another risk factor, "Long-Term Inflation Greater than 3.5%" was changed to "Extended period of elevated inflation" and assigned a low probability of occurrence but a high financial impact in recognition of current level of inflation.*

- *The board's investment consultant, Callan, worked in coordination with staff and the board to complete a comprehensive asset-liability study in fiscal 2022. The target asset mix slightly improved the expected risk-adjusted return, maintained awareness of total fund liquidity and diversification. Implementation of the asset-liability target mix will begin July 1 and be completed by Oct. 1.*

- *Investment staff, in coordination with the board's investment consultant will develop a Statement of Investment Beliefs. Investment beliefs serve to communicate to all stakeholders the board's underlying investment beliefs as well as guide and inform investment policy decisions. To initiate a collaborative effort among the board, investment consultant and investment staff, investment staff and the board's investment consultant will propose an initial set of investments beliefs to the board.*

- *The Investment staff will review the fiduciary audit investment recommendations and present a summary responses, proposed actions, and periodic progress updates to the board.*

- *The alternative investment team is continuing its efforts to pursue direct and co-investments, consistent with the board's strategic initiative. Staff has made meaningful progress on this initiative and deal flow remained consistent in fiscal 2022. We increased our internal capabilities in the asset class in fiscal 2022 with the hiring a new member to the alternative investments team to focus on direct and co-investments. Staff will continue to move ahead on the initiative in fiscal 2023 as opportunities develop.*

- *Meaningful progress on the strategic initiative to improve domestic equity performance continues. The asset class is on target to have value-added performance on a three-, five- and 10-year basis at the end of fiscal 2022. This continues an improving trend for the asset class. We will continue efforts to enhance the structure and performance of the asset class to sustain these positive results over future moving five-year periods. Staff will provide an update to the board in early fiscal 2023 to discuss trends in performance and provide an update on ongoing efforts within the asset class.*

- *Investment staff from all asset classes will continue to conduct ongoing research on various new potential strategies and refine and improve existing strategies as outlined in some of the following asset class sections of this plan. This is consistent with the board's strategic goal initiative for the investment program to develop strategies and tools that can increase returns, diversification or the flexibility to manage the assets.*

3. Asset Allocation/Risk/ERM Matrix

AVERAGE LONG-TERM POLICY WEIGHT, CURRENT ASSET WEIGHT AND STRATEGY FOR FISCAL 2023

(as a percentage of total assets at market)

	July 1, 2022 Neutral Weight	Preliminary April 30, 2022 Weight	General Strategy for Fiscal 2023*
Liquidity Reserves	1%	1.1%	We expect short-term interest rates to rise in fiscal 2023. We expect the Federal Reserve policy rate to increase throughout the first half of fiscal 2023 as the economy decelerates and inflation remains above the Federal Reserve's flexible average inflation target of 2%. With short-term market rates currently trading near 1.00%, we expect to earn a return above the policy return of 1.00%.
Fixed Income	21%	17.2%	Valuations reflect a restrictive monetary policy stance and the expectation that higher short-term rates are necessary to reduce inflation to acceptable levels. With a beginning yield on the benchmark near 4%, we project the asset class to generate returns above the policy return of 1.75%. The asset class received large redemptions during the fiscal year driven by rebalancing activity and liquidity needs to make benefit payments. Implementation of the 2022 asset-liability study will result in increasing the fixed income weight from 21% to 22% on Oct. 1, 2022. We expect competitive risk-adjusted returns compared to other assets classes and expect to reduce the underweight during fiscal 2023.
Equities			Earnings growth will remain positive albeit at lower growth rates than the recovery. Valuation multiples are likely to remain flat or decline as rising interest rates, inflation, COVID-19 lockdowns in China, and the Russian invasion of Ukraine pose risk to the forecast. Staff expects the domestic equity return to be above the policy return of 6.60%. Internationally, equities are more impacted by the risks mentioned above and staff expects the international equity return to be below the policy return of 6.80%. Implementation of the 2022 asset-liability study will result in decreasing the domestic equity weight from 28% to 26% and decreasing the international equity weight from 23% to 22%. As outlined in the left column, the initial phase-in will take place on July 1, 2022. The initial phase-in consists of a 1% reduction of domestic equity and a 1% decrease of international equity. The final phase-in, an additional 1% reduction of domestic equity, will occur on Oct. 1, 2022. Given our economic outlook and asset-liability study phase-in, we expect to be near policy weights to combined public equities, but our strategy will be altered tactically as our outlook and valuations evolve during the fiscal year.
Domestic	27%	27.6%	
International	22%	23.2%	
Total Equities	49%	50.8%	
Real Estate	10%	9.8%	The real estate asset class is projected to have returns at or slightly above the long-term policy return of 5.75%, with valuations adjusting higher as the fundamental backdrop for real estate improves with the real economy. We begin with an allocation near the neutral target weight. Staff will continue to pursue potentially attractive acquisitions that may develop from the current environment, but we expect the asset class will likely remain near the neutral target weight during fiscal 2023.
Alternative Investments			We project returns for the alternative asset class to be at the long-term policy return in fiscal 2023. Implementation of the 2022 asset-liability study will result in increasing the private equity weight from 7% to 9%. As outlined in the left column, the phase-in will take place on July 1, 2022. We will begin fiscal 2023 above the alternative investment target weight of 19%, with private equity above target and opportunistic/diversified below target. Staff will maintain a private equity commitment pace to manage the asset class weighting closer to target and will continue to reallocate exposure from the diversified portion of opportunistic/diversified into more opportunistic areas.
Private Equity	9%	12.1%	
Opportunistic/Diversified	10%	9.0%	
Total Alternatives	19%	21.1%	
Total	**100%**	**100.0%**	

*More detailed asset weightings and projections are provided to the Retirement Board at its monthly meetings, which provides the Retirement Board more current updates to the overall strategy.

RISK BUDGET

Investment Portfolio Risk

Introduction

There are three primary types of investment risk that the Retirement Board and staff need to manage: capital market risk, active management risk and liquidity risk. The first type describes the volatility of the policy returns and is a result of the plan assets being invested in the selected asset classes. The fiscal 2022 asset-liability study determined an acceptable amount of capital market risk (12.90%) and established appropriate allocations.

STRS Ohio actively manages most of its investments; therefore, the fund will have active management risk. This risk refers to the return fluctuations around the benchmark return that result from active management decisions. The amount of active management risk indicates how closely the portfolio returns will match the benchmark returns. The policy range of active management risk for the total fund is 20–160 basis points. Staff uses the risk budget to manage this risk. Although active management is a source of volatility, it is much lower than and uncorrelated with the capital market risk. This means that adding active management risk to the fund will not cause a large increase in total fund volatility. Thus, over the long run, the actions of the staff are not expected to change the total volatility of the fund materially.

Liquidity risk refers to the ability to meet short-term funding requirements without incurring a loss of capital in the process. For STRS Ohio, the most important consideration is the payment of the monthly benefits in a timely manner. Examples of other important secondary needs for liquidity include rebalancing the asset allocation to the policy target weights and funding contractual capital commitments to alternative investment managers. STRS Ohio is a mature pension plan with more than $4 billion in net benefit payments per year (benefits and operating expenses less contributions). This can create challenges for managing the assets during extended periods of market volatility. Therefore, the asset allocation and its implementation are key to ensuring there is sufficient liquidity at the total fund to efficiently meet all short-term funding requirements. The target asset mix from the fiscal 2022 asset-liability study reduced the overall equity weighting, increased the fixed income weighting, and maintained the liquid treasury portfolio to better manage liquidity needs of the total fund.

Asset Allocation and Capital Market Risk

The appropriate amount of capital market risk for the STRS Ohio portfolio is determined in an asset-liability study. The study establishes an optimal target weight for each asset class. This means there is no other combination of asset classes that has lower risk while achieving the same expected return. The fiscal 2022 asset-liability study updated expected returns, risk levels and the asset mix for the fund. Over a 10-year period, the board's investment consultant indicates that the accepted asset mix should generate a return of 6.03% (without value added). The following table contains the current and target allocations for each asset class and the expected return and capital market risk.

Asset Class	Expected Return	Capital Market Risk	Target Allocation[2]	Rebalancing Range	Approximate April 30, 2022 Weight
Domestic Equities	6.60%	17.95%	26%	21%–31%	27.6%
International Equities	6.80%	20.70%	22%	17%–27%	23.2%
Fixed Income	1.75%	3.75%	22%	13%–29%	17.2%
Real Estate	5.75%	14.20%	10%	6%–13%	9.8%
Private Equity	8.00%	27.60%	9%	6%–14%[3]	12.1%
Opportunistic/Diversified	5.73%	11.88%	10%	6%–14%[3]	9.0%
Liquidity Reserves	1.00%	0.90%	1%	0%–5%	1.1%
Total Fund	**6.03%**[1]				

[1] Does not include active management returns.

[2] Target Allocation is final weights reached Oct 1, 2022, after phase-in.

[3] The Private Equity and Opportunistic/Diversified target weights and rebalancing ranges are only meant to be general guidelines; the official target weight and rebalancing range is at the total alternative investment asset class level. The board approved rebalancing range for the total alternative investments asset class is 12%–25%.

There are several ways to quantify and characterize capital market risk for an asset mix:

- The expected capital market risk for the total fund benchmark is 12.90%, which means there is a 95% probability that the investment portfolio returns will be in an annual range of –19% to 31%.
- Another risk concept we utilize is the "value-at-risk." According to this measure, there is on average a 5% chance under the target allocation that the fund could lose $13.9 billion or more in a single year.

Risk Budgeting and Active Management Risk

Active management risk refers to portfolio return fluctuations around the benchmark return that result from active management decisions. Risk budgeting is a tool used by staff to efficiently allocate active management risk among the asset classes by assigning active management risk ranges. The goal of a risk budget is to maximize the active management returns earned within a board-approved active management risk range for the total fund. Empirical evidence shows that less efficient markets such as real estate and emerging markets offer greater opportunities for active management returns compared to more efficient markets such as domestic equities and domestic fixed income.

Based upon quantitative work developed by staff, we estimate that the total fund level of active management risk is currently 150 basis points. The STRS Ohio total fund return should track within plus or minus two times the expected active management risk level relative to the total fund composite benchmark. Thus, if the total fund composite benchmark earns 6.03% for the year, the STRS Ohio return is expected to be within 3.00% (two times 1.50%) of this return 95% of the time (i.e., between 3.03% and 9.03%). Similarly, in a year when the benchmark return is –3%, the STRS Ohio return is expected to be between –6.00% and 0.00%.

The policy range of active management risk for the total fund is established to achieve the net active management return goal of 40 basis points as specified in the Statement of Investment Objectives & Policy. This policy range is the basis for the policy ranges of the individual asset classes. Expected operating ranges for the asset classes are created by staff each year to efficiently achieve the desired level of active management risk for the total fund. Operating ranges must fall within the policy ranges for each asset class and for the total fund.

The table below shows the April 30, 2022, active management risk, and the fiscal 2023 expected operating range of active management risk for each asset class. These measures are expected to fluctuate during the fiscal year; however, no material deviations from these measures are anticipated. The active management risk of the total fund is expected to fall in the range of 60–160 basis points during fiscal 2023. This range includes tactical risk (due to asset allocation decisions) that is not included within the individual asset class active management risk estimates. These asset allocation decisions are likely to vary throughout the year, so this will result in various amounts of tactical risk.

FISCAL 2023 ACTIVE MANAGEMENT RISK

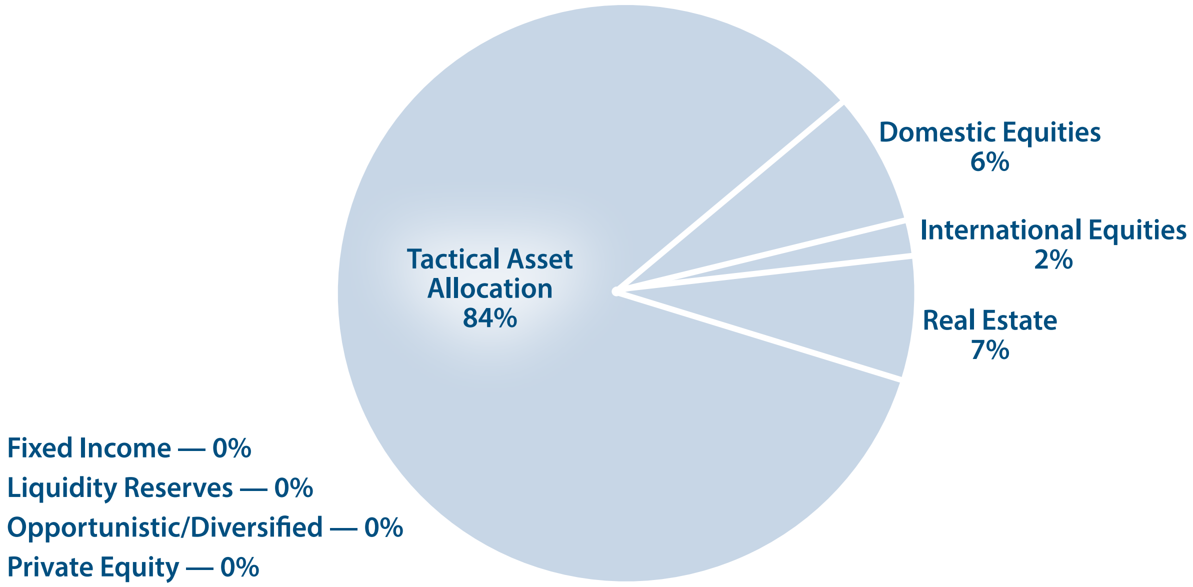
Asset Class	April 30, 2022 Active Management Risk (basis points)	Expected Fiscal 2023 Operating Range (basis points)	Policy Range (basis points)
Liquidity Reserves	N/A	N/A	N/A
Core Fixed Income	27	20–120	10–150
Domestic Equities	92	50–150	20–150
International Equities	93	70–125	60–250
Real Estate	350	350*	200–700
Alternative Investments	N/A	N/A	N/A
Tactical Asset Allocation	133	40–140	N/A
Total Fund	**150**	**60–160**	**20–160**

*As explained in the paragraph that follows, this estimate is static unless a significant portfolio adjustment occurs.

Unlike other asset classes, real estate does not have a model that can be used to accurately estimate active management risk. Instead, the estimate is based on historical active management returns, the amount of leverage in the portfolio, and past real estate market volatility. These factors are unlikely to change much over time without a significant change to the portfolio; therefore, the estimated active management risk for real estate will be static most years.

The following chart explains where the active management risk for the total fund is generated.

CONTRIBUTION TO ACTIVE MANAGEMENT RISK



IMPACT AND PROBABILITY ANALYSIS FOR INVESTMENTS

PROBABILITY

FINANCIAL IMPACT	HIGH	MEDIUM	LOW
HIGH	• Not earning the actuarial assumed rate of return over the 10-year period	• Long-term sovereign deficit and debt issues	• Diversification ineffective • Significant negative investment return in any one year • Extended period of elevated inflation
MEDIUM		• Recession • Global financial stress related to low economic growth	• ~~Recession~~ • Deflation • ~~Long-term inflation greater than 3.5%~~
LOW	• Not earning the actuarial assumed rate of return in a fiscal year	• Corporate fraud (securities litigation) • Buy Ohio	• Poor investment • Divestment • Investment operations failures

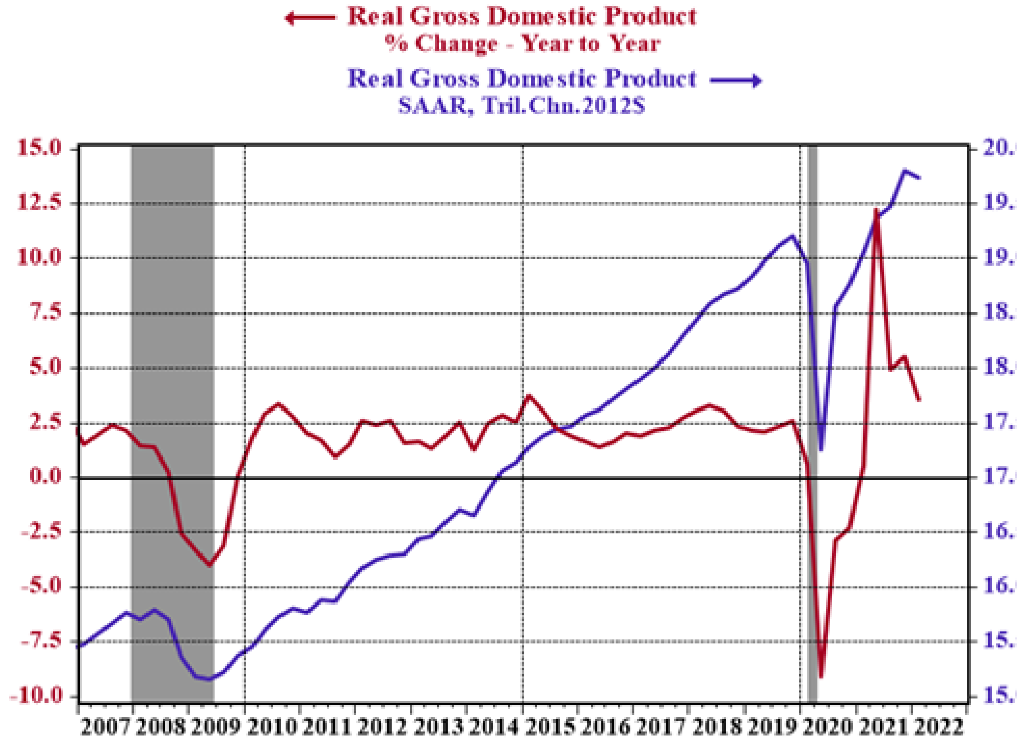
4. Fiscal 2023 Economic Outlook

U.S. ECONOMIC GROWTH AND INFLATION OUTLOOK

Since the COVID-19 pandemic recession occurred near the end of fiscal 2020, U.S. economic activity has been turbulent. The economy was affected by lockdowns and other mitigation efforts that attempted to control the initial COVID-19 strain, a soaring recovery once the lockdowns were lifted, additional virus variants that temporarily reintroduced controls on businesses and consumers, supply chain disruptions and, most recently, a Russian invasion of Ukraine that has been countered by Western nations. These issues have forced U.S. and foreign policymakers to adopt flexible fiscal and monetary policies that focused on supporting economic growth. However, by doing so, price inflation in the United States and elsewhere has skyrocketed, leading to 40-year highs in costs for businesses and consumers.

With the COVID-19 pandemic easing to acceptable conditions across most of the globe, policymakers have now turned their attention to reining in that soaring inflation before it becomes deeply rooted in future inflation expectations for businesses and consumers. In particular, monetary policymakers are aiming to put the inflation genie back in the bottle before more havoc unfolds. There will likely be a great deal of tightening for monetary policies around the world in coming quarters — a change in those policies that has raised recession risks around the globe. At a minimum, real economic growth in the United States will slow meaningfully from the 12.2% surge in fiscal 2021 and the robust 4.6% annualized pace in the first half of fiscal 2022. Though the economy's underlying growth in fiscal 2022's third quarter advanced at a still-strong 3.7% rate, the headline real gross domestic product growth rate fell by an annualized 1.4% in that quarter largely due to deteriorating international trade and slower inventory growth.

WITH LESS STIMULATIVE MONETARY AND FISCAL POLICIES, ECONOMIC ACTIVITY SHOULD DECELERATE TOWARD TREND



Source: Bureau of Economic Analysis

Note: Shaded areas denote recession.

Real (inflation-adjusted) economic activity in the final quarter of fiscal 2022 should return to positive territory but could continue to disappoint relative to recent years. That type of exit to fiscal 2022 and the profound change to U.S. monetary policy planned for fiscal 2023 should ease economic growth to marginally above its long-term trend of roughly 2.0% potential growth through slower demand for goods and services. In turn, that should slow inflation to moderately-above the Federal Reserve's long-term policy goal later in fiscal 2023. That expected change in the support for the U.S. economy is already raising recession risks for fiscal 2023 but most recession models point toward a larger, more significant, threat for fiscal 2024 — particularly if monetary policymakers are unable to align acceptable growth with acceptable inflation in the coming fiscal year.

As the chart on the prior page shows, the rapid recovery and strength shown in the current economic expansion followed a classic V-shaped pattern (blue line) — unlike the more gradual, slower U-shaped recovery that came after the Great Recession of 2007–2009. However, the pace of economic activity (red line) peaked at the end of fiscal 2021 when it reached a 12.2% year-over-year growth rate. Through fiscal 2022's third quarter, that growth rate has slowed to 3.6% — still well above the economy's long-term potential — and is likely headed to even more moderate activity of roughly 2.4% in fiscal 2023, according to the STRS Ohio economic forecast. That would return economic growth to roughly the average pace recorded during the longest U.S. economic expansion of 2009–2019 when activity grew an average annualized 2.3%. Real private domestic final sales growth (a core measure of economic activity that consists of GDP less volatile inventory changes, government spending and foreign trade) should grow right at the economy's long-term trend of roughly 2% after advancing by a solid 2.6% in fiscal 2022.

Higher interest rates from more restrictive monetary policy will eat away at potential growth in interest rate sensitive economic sectors. Residential investment that has already begun to soften with the Federal Reserve's forward guidance of tighter monetary policy will likely fall during fiscal 2023. The National Association of Realtors' housing affordability index has plunged in the early months of calendar 2023 due to soaring mortgage rates and ongoing massive growth in home prices. Home price to income ratios have blown past the peak registered during the height of the housing bubble in late 2005. While mortgage originations have not been as speculative as they were during the housing bubble and the supply of homes remains limited, the higher interest rate environment in fiscal 2023 should continue to weigh on housing affordability. For now, home builders remain enthusiastic about future housing developments but that should change as demand weakens. In fiscal 2023, housing starts are expected to ease from 1.665 million units in fiscal 2022 to 1.529 million units and real residential investment is forecasted to fall 3%.

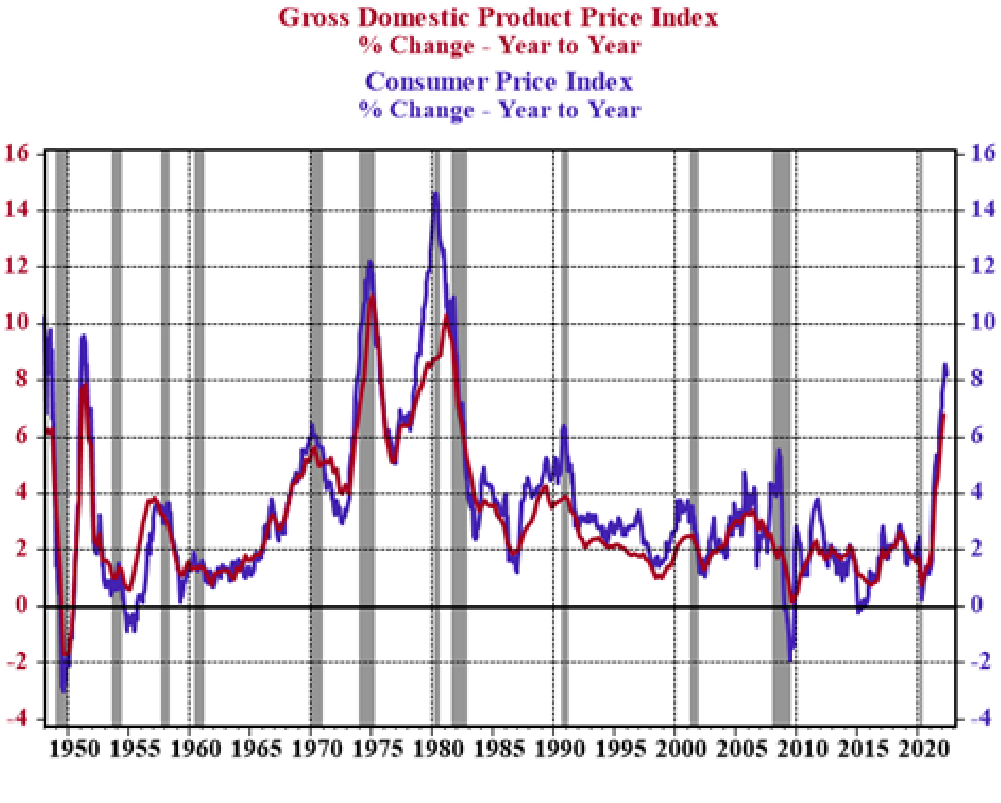
Business fixed investment should continue to grow above the economy's long-term trend in fiscal 2023 after robust 5.3% expected growth in fiscal 2022 and a vigorous 13.3% gain in fiscal 2021. Orders for capital equipment continue to accelerate in late fiscal 2022 and capital spending plans from companies remain strong, though slightly off their expansion peak. Larger companies continue to outpace smaller ones since the pandemic recession devastated smaller companies. But, even with surveys that focus on larger companies, a notable softening trend has developed this spring. For fiscal 2023, non-residential investment is expected to grow by about 2.6% — roughly half the growth rate of fiscal 2022.

In March and April, the jobs market moved ever closer to the conditions that existed prior to the pandemic. The unemployment rate fell to 3.6% — just above the 3.5% rate before the pandemic — from 5.9% at the beginning of fiscal 2022, while the number of employed rose to a level just one million short of the peak prior to the recession. The difference between nationwide job openings and the number of unemployed remains at record highs while wage pressures continue to grow for companies. Nearly all employment indicators point to a continued strong labor market. That has left The Conference Board's consumer confidence index at a relatively high level because its survey places a large focus on consumer assessments of employment conditions. However, the University of Michigan's consumer sentiment index plunged to recession-like lows in May because its survey focuses more on financial market conditions that are being heavily impacted by unacceptable inflation in the United States and elsewhere.

Like other economic sectors, the fundamental conditions for real consumer spending (about 70% of the U.S. economy) remain quite positive heading into fiscal 2023. The labor market is strong and wage growth robust. Yet, high inflation continues to weaken the magnitude of wage gains. In fiscal 2023, strong household net worth and a moderate amount of personal saving should help consumer spending overcome much of the inflation problem, but real consumer spending should continue to moderate from the incredible growth of fiscal 2021 and periodic strong activity in fiscal 2022. The STRS Ohio economic forecast expects real personal consumption will grow a trend-like 2.1% in fiscal 2023 but greater downside risks to that forecast outweigh the potential for positive surprises.

Combining these core economic sectors, real private domestic final sales should grow by roughly 2% in fiscal 2023 after 2.6% growth in fiscal 2022 and the 16% surge of fiscal 2021. That would mean the projected 2.4% growth for real gross domestic product in fiscal 2023 moderately amplifies the true underlying conditions of the U.S. economy. With the slowing topline and core growth rates, recession risks for the year ahead have grown from 10% at the time of the fiscal 2022 midyear economic forecast update to about 20% currently for fiscal 2023. Recession probability models are generally registering 20%–25% recession risks for the year ahead. Given the change in direction for both fiscal and, in particular, monetary policy for the upcoming year, recession probabilities will likely grow for the period beyond fiscal 2023. Historically, probabilities above 30% start to become alarming while those exceeding 40% signal a recession within a year or so.

INFLATION HAS SOARED WELL BEYOND THE ACCEPTABLE RANGE FOR THE FEDERAL RESERVE



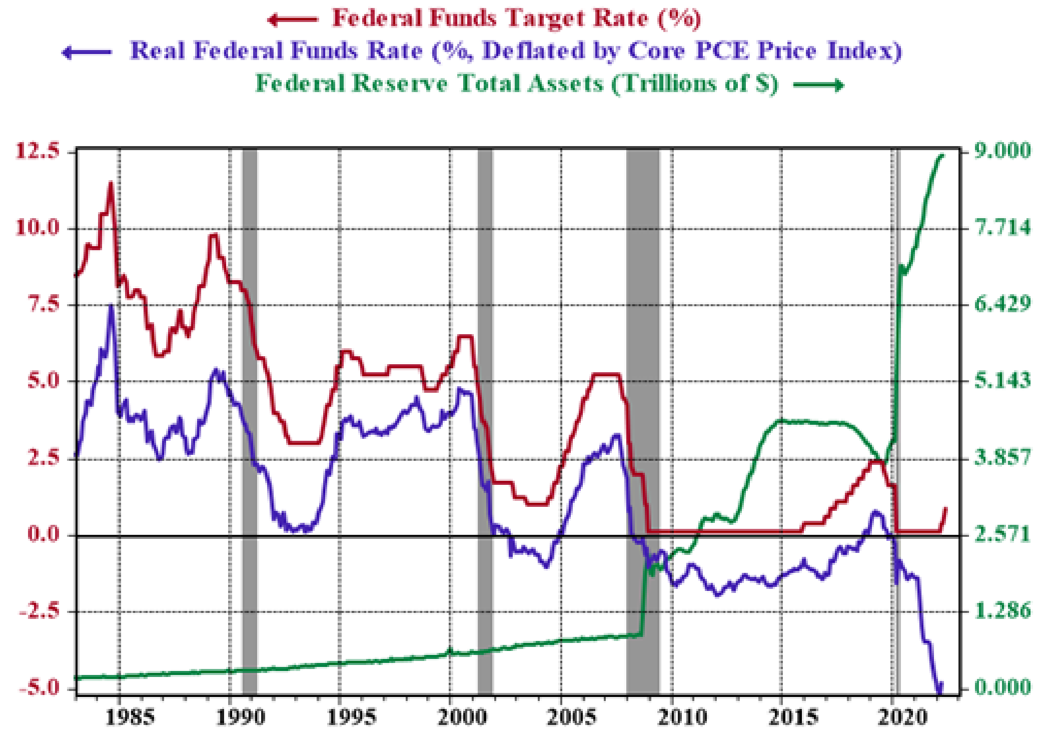
Sources: Bureau of Economic Analysis, Bureau of Labor Statistics

Note: Shaded areas denote recession.

Commonly cited inflation indicators began to significantly accelerate in the spring of 2021 (see the chart above). At the time and for about a half-year later, Federal Reserve officials and most economists attributed much of the surge to global supply chain disruptions following the shutdown and reopening of economies around the world during the COVID-19 pandemic. The surge in demand for goods and services from stimulative fiscal and monetary policy around the world put a great deal of pressure on limited supplies of materials and labor. Forty-year highs in inflation followed. Meanwhile, monetary policymakers in the United States treated the inflation surge as transitory, expecting the supply and demand imbalances would ease in our fiscal 2022 and return average inflation into an acceptable range around the Federal Reserve's long-term policy target of 2% inflation. When non-traditional inflation measures like Dallas Federal Reserve Bank's trimmed mean personal consumption expenditures (PCE) price index also began to surge in the fall of 2021, monetary policymakers started to fear that unacceptably high inflation could become more established in consumer and business expectations. Soon after, Federal Reserve policymakers provided forward guidance that the days of easy money to protect against intermittent fears of an economic downturn would end and that a concerted effort to lower inflation was about to begin.

As of its May monetary policy meeting, the Federal Reserve has moved up the range on its main policy tool — the short-term federal funds rate — to 0.75%–1% (red line in the chart below) from the 0%–0.25% range it moved within for two years ending with mid-March 2022. There is much more to come. Most monetary policy officials would like to return policy to a neutral stance by the end of calendar 2022. That would result in roughly an additional 1.5%–2% increase in short-term interest rates through the first half of fiscal 2023. At that point, the Federal Reserve would reassess how economic growth and inflation are behaving before implementing further changes to the federal funds rate. The STRS Ohio baseline economic forecast expects an additional 0.5% or so increase in the federal funds rate during fiscal 2023's second half, leaving that interest rate range's midpoint at about 3.125% when the fiscal year ends. If core PCE prices (that exclude food and energy costs from total PCE prices and is closely followed by Federal Reserve officials) grow around the 2.6% pace forecasted for the total index in fiscal 2023, the real (inflation-adjusted) federal funds rate would close the fiscal year at roughly 0.5% (blue line in the chart below). Historically, a real short-term rate that low does not typically precede a recession, but those conditions did exist in the summer of 2019 when the financial markets were debating growing recession risks well before the COVID-19 pandemic began. So, a change in Federal Reserve policy that slows inflation growth through higher interest rates should continue to raise recession risks later in fiscal 2023 that could then impact fiscal 2024.

FEDERAL RESERVE WILL STRIVE FOR A NEUTRAL MONETARY POLICY BEFORE MOVING TOWARD A RESTRICTIVE STANCE



Source: Federal Reserve Board

Note: Shaded areas denote recession.

Besides its main policy tool of targeting a stimulative range for the nominal federal funds rate during and after the COVID-19 recession, the Federal Reserve has more than doubled the level of assets on its balance sheet to nearly $9 trillion (green line in the chart on the prior page), or roughly 36.5% the size of U.S. nominal economy. Prior to the global financial crisis in 2008–2009 and the resulting Great Recession, the Federal Reserve did not actively use quantitative easing as a monetary policy tool to keep longer-term interest rates lower as well. Indeed, assets on its balance sheet were consistently around just 6% of nominal GDP prior to the global financial crisis. The Federal Reserve has already announced a plan to allow assets to run off its balance sheet as they mature. If the program plays out without causing too strong of a surge in long-term interest rates that then leads the central bank to adjust quantitative tightening, then roughly $1.1 trillion in assets would leave the Federal Reserve's balance sheet each year going forward. The forward guidance on this quantitative tightening program along with the course being described for short-term interest rates has already led to an increase in U.S. long-term interest rates. In fiscal 2023, short- and long-term interest rates should continue to face upward pressure from the changes in monetary policy. Given those expectations, relevant ranges for the federal funds rate and 10-year Treasury yield for the upcoming fiscal year are listed in the table below.

Period	Federal Funds Rate	10-Year Treasury Yield
Fiscal 2023 Ranges	1%–3.75%	1.75%–4%

Note: The ranges listed anticipate capturing 90% of the daily closes during the period described. Brief excursions above or below these ranges that are quickly reversed should not be considered violations of the forecast.

The baseline economic forecast during fiscal 2023 of activity at or moderately-above the long-term trend with real GDP growth in a range of 1.5%–3% carries about a 50% chance of occurring. There remains a great deal of uncertainty how the COVID-19 pandemic will play out in China, how the Russian invasion of Ukraine develops and how attempts to corral high inflation in the United States and elsewhere work, but it is likely that greater downside risks to growth exist than do upside ones. Slower, but non-recessionary economic growth than the baseline forecast carries a 15% chance of occurring and recession risks are currently at about 20% for the upcoming year. More robust economic growth above the baseline forecast range carries about a 15% of occurring. The baseline U.S. forecast of 2.4% real GDP growth and 3.1% GDP price index growth is marginally slower than the Bloomberg weighted average consensus real GDP growth of 2.3% and the Blue Chip Economic Indicators GDP price index growth of 3.4%. The nominal GDP growth rate in the STRS Ohio forecast would be roughly 5.5%, while the consensus expectation would be for about 5.7% growth in fiscal 2023.

U.S. ECONOMIC FORECAST SUMMARY

Composition of Real GDP	Fiscal Year Ranges	FY 2023	FY 2023		FY 2022	FY 2022		FY 2021
			H1	H2		H1	H2	
Gross Domestic Product	1.5%–3.0%	2.4%	2.6%	2.2%	2.4%	4.6%	0.2%	12.2%
Personal Consumption	1.25%–2.75%	2.1%	2.1%	2.1%	2.4%	2.2%	2.5%	16.2%
Nonresidential Investment	(2.5%)–7.5%	2.6%	3.0%	2.3%	5.3%	2.3%	8.4%	13.3%
Residential Investment		(3.0%)	(5.0%)	(1.0%)	(0.9%)	(2.9%)	1.0%	21.1%
Exports of Goods & Services		5.7%	7.0%	4.5%	4.3%	7.6%	1.0%	18.6%
Imports of Goods & Services		2.3%	2.0%	2.6%	11.1%	11.1%	11.2%	30.6%
Federal Consumption & Investment		1.0%	0.7%	1.2%	(3.7%)	(4.7%)	(2.8%)	(0.9%)
State & Local Consumption & Investment		1.6%	1.7%	1.5%	1.0%	1.6%	0.4%	0.3%
Final Sales		2.4%	2.7%	2.1%	0.8%	0.8%	0.8%	11.3%
Domestic Final Sales		1.9%	1.7%	2.1%	2.1%	1.5%	2.7%	12.9%
Private Domestic Final Sales		2.0%	1.9%	2.0%	2.6%	2.0%	3.3%	16.0%
Incomes								
Real Disposable Personal Income		2.6%	2.4%	2.7%	(2.8%)	(4.8%)	(0.8%)	(4.3%)
Nominal GDP Corporate Profits, After Tax	(2.5%)–7.5%	2.8%	3.3%	2.2%	3.5%	7.2%	(0.1%)	43.4%
Prices								
Consumer Price Index		2.9%	3.4%	2.5%	7.5%	7.3%	7.6%	4.8%
Consumer Price Index Ex Food & Energy	2.0%–3.5%	2.7%	3.1%	2.3%	5.8%	5.5%	6.1%	3.7%
Personal Consumption Expenditures Price Index		2.6%	3.1%	2.1%	6.1%	5.8%	6.3%	3.9%
GDP Price Index		3.1%	3.5%	2.6%	6.6%	6.5%	6.6%	4.1%
Other Key Measures								
Real Net Exports ($B)	($1540)–($1480)	($1500.7)	($1507.8)	($1493.7)	($1437.5)	($1333.4)	($1541.7)	($1156.2)
Real Change in Business Inventories ($B)		$102.5	$102.5	$102.5	$99.5	$63.2	$135.9	($35.7)
Light Vehicle Sales (M)		16.13	15.88	16.38	13.83	13.24	14.42	16.45
New Housing Starts (M)	1.45–1.65	1.529	1.550	1.508	1.665	1.616	1.714	1.551
Industrial Production		3.1%	3.9%	2.4%	5.8%	3.6%	8.1%	14.7%
Unemployment Rate		3.7%	3.6%	3.8%	4.2%	4.7%	3.7%	6.9%

INTERNATIONAL ECONOMIC GROWTH AND INFLATION OUTLOOK

In fiscal 2022, real (inflation-adjusted) economic activity for most major countries grew well above their long-term trend rates to fully recover from the deep recessions caused by the COVID-19 pandemic's first wave. Having fully recovered, they will grow only slightly above the trend rates in fiscal 2023 as they grapple with multiple headwinds. These include geopolitical uncertainty caused by the Russian invasion of Ukraine, the tightening of global monetary conditions as most central banks raise their policy interest rates, persistent global supply chain problems that have led to prolonged inflation pressures and slower growth in China due to its zero-COVID-19 policy that restricts some business activity. Since most emerging countries had already recovered fully in early fiscal 2022, their central banks have previously squeezed monetary conditions. As that tightening works through their economies, it will moderate economic activity and contribute to slower global growth in fiscal 2023. Now that central banks of developed countries, too, have begun tightening monetary conditions, economic activity in developed countries will moderate as well.

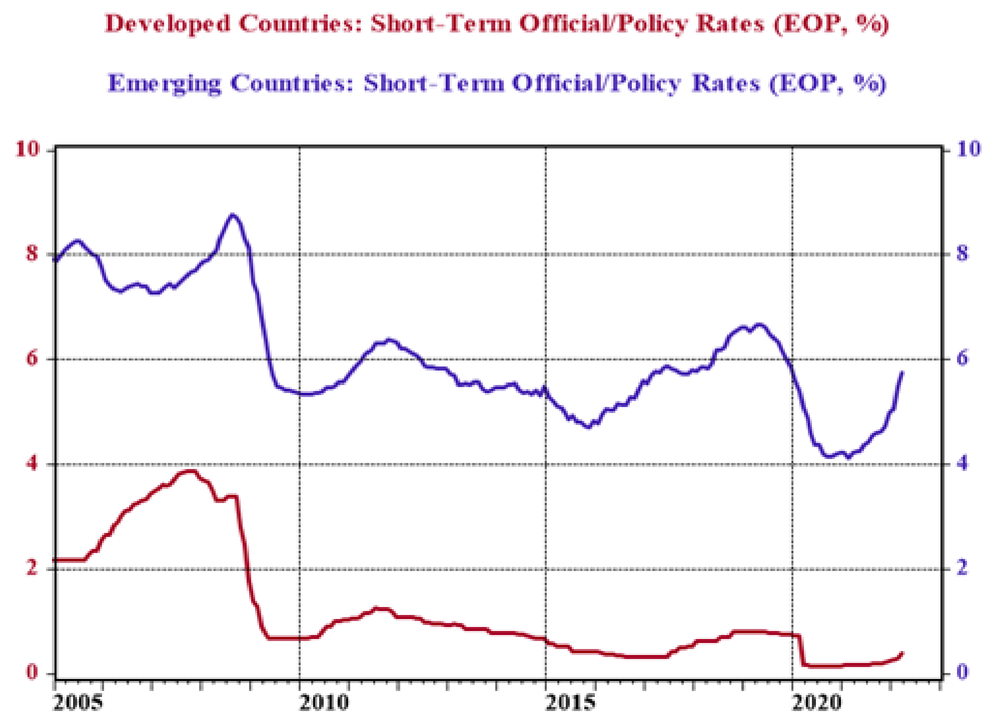
Inflation in most countries will gradually recede toward the central bank policy target rates, but it will stay above those targets through the end of fiscal 2023. Monetary policymakers will continue to assess how various headwinds sway inflation. For instance, besides full economic recovery and a tight labor market, a key reason for tightening monetary conditions is to prevent inflation expectations from rising. Policymakers will be observing closely if higher inflation expectations lead workers to negotiate higher wages because increased wage costs may add to the inflation pressures that have developed due to the global supply problems. Policymakers will also observe the extent to which elevated global food and energy prices may dampen demand that, in turn, could soften economic activity as well as prices of other goods and services. This issue is more acute in emerging countries than in developed ones as food and energy tend to be bigger slices of household budgets in those countries. Meanwhile, the geopolitical uncertainty due to the Russian invasion of Ukraine will influence economic policies, especially in the eurozone where a fallout will likely be felt more intensely than elsewhere. Thus, the course of monetary tightening will remain more uncertain than usual as it will be influenced by multiple cross currents.

After fully recovering by mid-fiscal 2022, the eurozone's real gross domestic product (GDP) will advance just above its long-term trend growth rate of about 1.1% in fiscal 2023. The prominent risks to this growth outlook are to the downside and stem primarily from the Russian invasion of Ukraine. Due to the region's dependence on Russian energy supplies, the conflict has increased the risk that geopolitical tensions may suddenly disrupt those supplies and lead food and energy prices to surge. Though the region's policymakers have pledged to cut the dependence on Russian energy supply, they have been careful not to upset current production and consumption because few alternative energy sources are available in the near term. Nonetheless, this geopolitical shock has mobilized longer-term policies to develop alternative energy sources and is leading to new cross-border relationships that help access conventional energy supplies from elsewhere. Though the region's governments have proposed various fiscal measures to reduce the distress of high energy costs, the geopolitical shock has injected greater uncertainty into the outlooks of consumers and businesses, dampening economic activity.

That uncertainty has extended to the monetary policy outlook of the European Central Bank (ECB). After ending its quantitative easing program by the onset of fiscal 2023, the ECB will guide investors on the likely course of future policy rate increases. Monetary policymakers have left open the possibility of continuing the quantitative easing program through the first quarter of fiscal 2023 in case the Russian invasion of Ukraine slows growth more than anticipated. However, full economic recovery, tight labor markets and elevated inflation strongly indicate that the ECB will lean toward raising its policy interest rates in the first half of fiscal 2023 rather than the second half. It is likely to first raise the deposit rate from –0.5% to zero. It will then lift the main policy interest rate from zero by 0.75%–1.25% in 0.25% increments through the rest of the fiscal year.

The Bank of England has already hiked its main policy interest rate from 0.1% to 1.0%. After lifting the rate by another 0.25% by the end of fiscal 2022, it will increase it further by 1.25%–1.50% in fiscal 2023. Monetary policymakers expect that real GDP will grow at a trend-like pace with the risk to that outlook being on the downside as inflation stays elevated through fiscal 2023. Since the United Kingdom is less dependent than the eurozone on Russian energy supplies, it is less vulnerable than the eurozone to the potential fallout from the Russian invasion of Ukraine. Nonetheless, demand is likely to soften as inflation, especially the prices of food and energy, reduce the purchasing power of consumers and firms.

POLICY INTEREST RATES TO RISE IN MOST COUNTRIES



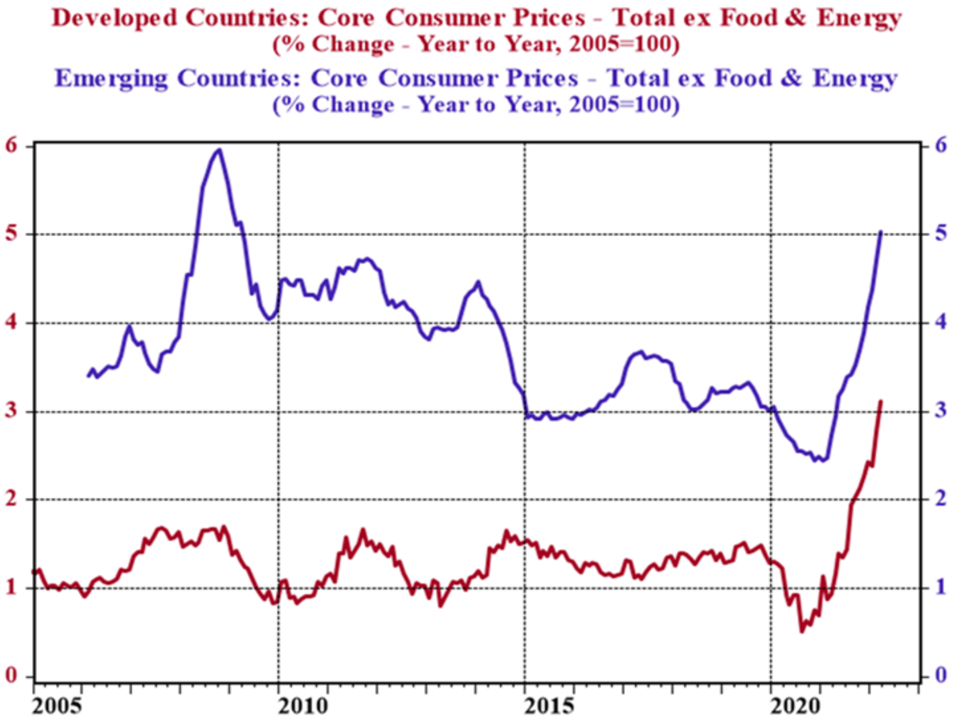
Source: Federal Reserve Bank of Dallas

Meanwhile, the Bank of Japan has reiterated that it will keep its policy interest rate close to zero and subdue long-term interest rates through its policy of yield curve control until inflation (excluding energy and fresh food prices) grows at a 2.0% annual rate in a sustained way. Among developed countries, Japan's economy has been the slowest to recover from the recession and has remained more vulnerable to the spread of COVID-19 variants. Furthermore, it faces risks from slower growth in China that has been under pressure with a resurgence of the pandemic.

China has been struggling mainly because its zero-COVID-19 policy has imposed strict lockdowns whenever COVID-19 cases have increased. This has led to significant drops in economic activity as domestic demand, especially for consumer goods, has fallen steeply. Since China is also a global manufacturing hub and a critical link in the global supply chains, the lockdowns have exacerbated the shortages of manufacturing goods abroad, contributing to the supply-side inflation pressures as the supply of goods has been inadequate to meet robust demand. Meanwhile, the government has said that it will continue its zero-COVID-19 policy to subdue any outbreaks. Consequently, the disruptions to global supply chains may continue and it is global demand that may eventually have to diminish for those inflation pressures to recede.

Within China, however, demand has weakened substantially during the lockdown. Unlike most other major countries where monetary and fiscal conditions are being tightened, China will be expanding monetary and fiscal policies during fiscal 2023. While the government has proposed spending on infrastructure, that is subject to constraints like the ones on other economic activity. Monetary policymakers have cut interest rates, but there is insufficient demand for loans due to poor underlying demand for goods and services. Consequently, China's real GDP is expected to grow at a 4.2% annual rate, a pace closer to the lower end of its 4.0%–5.0% trend growth range and about 1.0% slower than the government's 5.0%–5.5% growth target. The prominent risk is that growth may slip below 4.0% if COVID-19 cases do not fall enough or if a new wave of infections develops in fiscal 2023.

INFLATION TO STAY ABOVE MOST CENTRAL BANKS' MONETARY POLICY TARGETS



Source: Federal Reserve Bank of Dallas

Meanwhile, India's economy suffered a setback from the spread of the delta variant of COVID-19 that sent economic activity below the threshold of a full economic recovery from the first wave of the pandemic. Economic activity has since climbed at a trend-like pace and that should continue in fiscal 2023. Inflation has climbed toward the upper end of the central bank's 2.0%–6.0% policy target range. Consequently, monetary policy makers have begun raising the policy interest rate and are expected to increase it by 3.0%–4.0% during fiscal 2023.

Having started to raise interest rates early in fiscal 2022, central banks in Latin America have been at the forefront of global monetary tightening. Brazil's central bank has raised its policy interest rate by almost 8.5% during fiscal 2022 and is expected to raise it further by 3.0%–4.0% in fiscal 2023. Inflation steadily climbed through fiscal 2022 to about a 12.0% annual rate and policymakers aim to bring it down to about a 3.0% clip through November 2024. Though the commodity-related sectors stand to benefit from the rise in global commodity prices, the dampening effects of monetary tightening will likely outweigh any benefits from those prices. With a lot of the monetary tightening already in the pipeline and more interest rate increases in the offing, economic activity is expected to slow markedly to a below-trend pace. Likewise, in Mexico, economic activity should remain subdued from the hawkish monetary policy of the central bank that has raised the policy interest rate by 2.25% in fiscal 2022 and is expected to lift it further by about 2.0% in fiscal 2023.

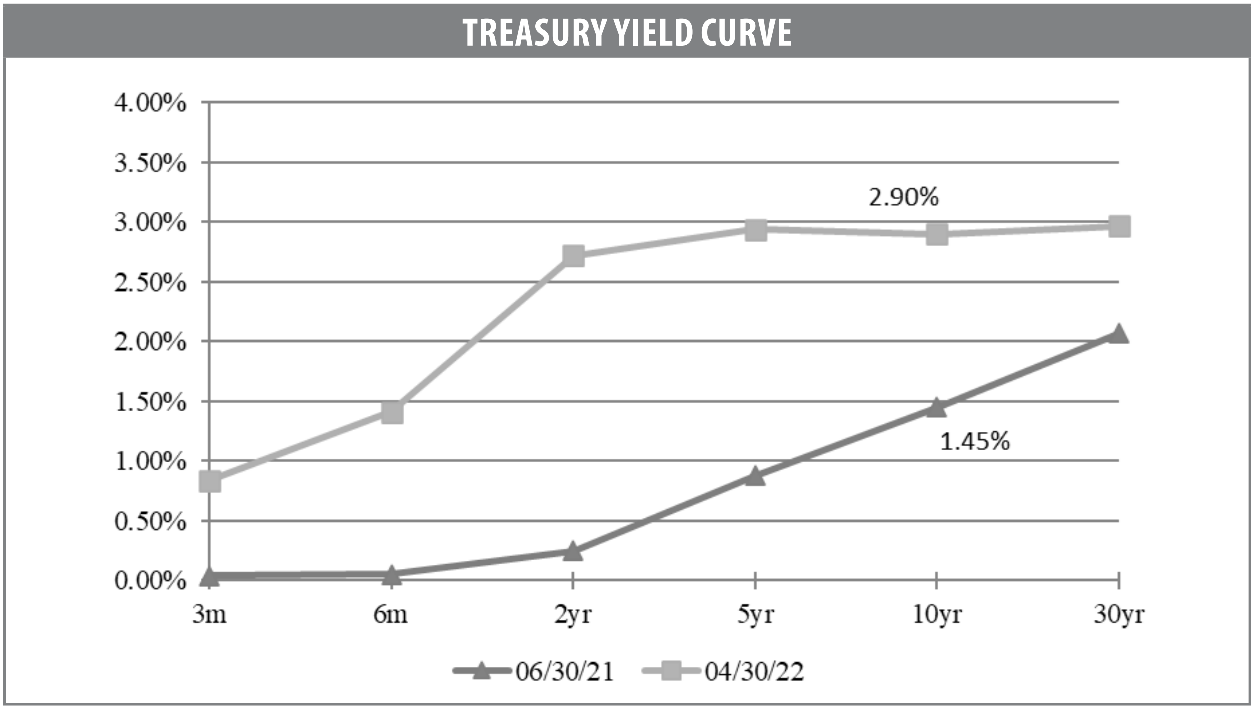
All told, facing several headwinds, the global economy will grow at a markedly slower pace in fiscal 2023 than in fiscal 2022. Nearly all major central banks will be tightening monetary conditions to subdue inflation toward their policy target rates. The global supply chain problems due to China's zero-COVID-19 policy may continue to constrain supply relative to demand, prolonging the upward pressures on prices. Furthermore, the Russian invasion of Ukraine adds more uncertainty to the inflation outlook. As rising prices of essential goods and services reduce purchasing power, overall global demand is expected to moderate through the end of fiscal 2023, though by not enough to lower inflation below the central banks' policy target rates by then.

INTERNATIONAL FORECASTS

	Real Gross Domestic Product		Inflation	
Country/Region	**FY 2023**	**FY 2022**	**FY 2023**	**FY 2022**
Canada	2.8%	4.6%	3.0%	6.0%
United Kingdom	1.3%	3.2%	3.5%	8.1%
Eurozone	1.4%	3.0%	3.3%	7.8%
Germany	1.3%	2.0%	4.0%	7.9%
France	1.8%	4.2%	3.0%	5.7%
Italy	1.4%	3.3%	4.5%	7.2%
Asia–Pacific				
Japan	1.0%	1.5%	1.2%	1.5%
China	4.2%	4.5%	2.3%	2.1%
India	6.5%	13.0%	6.0%	7.4%
Australia	2.7%	3.6%	3.5%	4.6%
South Korea	2.1%	2.5%	2.7%	4.4%
Latin America				
Brazil	1.1%	0.6%	7.0%	12.2%
Mexico	1.0%	0.4%	5.0%	7.0%

5. Fixed Income Investments

TREASURY YIELD CURVE



OUTLOOK

Bond Market Returns

We forecast the total return of the fixed income market to be above the STRS Ohio policy return of 1.75% in fiscal 2023. The fixed income benchmark yield begins the fiscal year above the policy return at 3.87%. Since the benchmark yield is above the policy return and we forecast prices in the benchmark to be little changed, we expect the benchmark to finish fiscal 2023 above the policy total return.

Federal Reserve

The Federal Reserve raised the federal funds rate to a range of 0.75% to 1.00% from the effective lower bound of 0% to 0.25% during fiscal 2022. As employment improved and the Fed initially viewed above-target inflation as transitory, the Federal Reserve held off on raising short-term interest rates. However, as inflation remained stubbornly above the Federal Reserve's 2% target, the Fed abruptly changed its inflation view and began to prepare the market for interest rate increases. The Federal Reserve ended its asset purchase program known as quantitative easing and began to increase short-term interest rates late in the fiscal year.

We expect the Federal Reserve will increase the federal funds rate during fiscal 2023 and are forecasting a range of 1.00%–3.75%. This forecast reflects our expectation that the Federal Reserve will reduce monetary policy accommodation and transition to a more neutral or even restrictive monetary policy. The Federal Reserve will closely monitor the trajectory of inflation during fiscal 2023. If inflation falls faster than expected toward the Federal Reserve's 2% target, then we expect the Federal Reserve will raise short-term interest rates near the middle of our forecasted range. However, if inflation remains well above target, the Federal Reserve will likely adopt a more restrictive monetary policy and raise short-term interest rates closer to the high end of our forecasted range.

In addition to interest rate increases, the Federal Reserve has announced it will now focus on reducing the size of its balance sheet through maturities and principal payments known as quantitative tightening (QT). The Federal Reserve will stop reinvesting principal payments from U.S. Treasuries and agency mortgage-backed securities subject to monthly caps. It will begin the balance sheet reduction process in June 2022 by allowing its holdings of U.S. Treasuries to decline by up to $30 billion per month and agency mortgage-backed securities to decline by up to $17.5 billion per month. In September 2022, the monthly caps will increase, and the Federal Reserve will allow its holdings of U.S. Treasuries to decline by up to $60 billion per month and agency mortgage-backed securities to decline by up to $35 billion per month. The Federal Reserve expects this balance sheet reduction will work in concert with increases in the federal funds rate and will tighten monetary policy with the goal of reducing inflation.

Market Interest Rates

Our forecasted 10-year U.S. Treasury interest rate range is 1.75%–4.00%. The expected 10-year U.S. Treasury interest rate range is based on the STRS Ohio economic forecast of moderate economic growth, a reduction in inflation, expected Federal Reserve interest rate increases, and the reduction of the Federal Reserve's balance sheet.

Interest rates rose rapidly during fiscal 2022 as the Federal Reserve began raising short-term interest rates and signaled further tightening of monetary policy. The Federal Reserve's announcement of the end of its asset purchase program and the subsequent announcement of its intention to shrink its balance sheet through maturities and principal payments put further upward pressure on interest rates. The rise in interest rates has resulted in the lowest fixed income returns since the early 1980's. The yield curve is now pricing in a more restrictive monetary policy from the Federal Reserve. The 10-year U.S. Treasury yield is trading close to the middle of our interest rate range which we view as fair value.

Stronger economic growth, higher than expected inflation, quantitative tightening, and continued successful mitigation of the COVID-19 support the upper end of the interest rate range. On the other hand, a weaker economic growth environment, inflation falling even faster than expected, unsuccessful mitigation of COVID-19, or an escalation of the Russian invasion of Ukraine support the lower end of our range.

Credit Quality

Corporate credit quality should remain stable during fiscal 2023 despite concerns that economic growth will slow. Monetary policy will likely become less accommodative and fiscal policy will be much more subdued compared to the last two years. Notwithstanding monetary and fiscal policy headwinds, bank lending standards and merger and acquisition volumes indicate capital is available to fundamentally strong companies. Industrial companies' revenues and profits should continue to grow but at a slower rate given subdued economic growth and expected higher interest rates. Additionally, based on a more difficult economic environment we expect companies to be conservative with their financial policies, resulting in little to no growth in leverage. Companies will focus on operational efficiency and the ability to pass on increased costs to maintain margins and offset inflation pressures from increased labor and raw materials costs.

Banks continue to have high levels of capital and liquidity, which allowed the sector to meet the challenges of the pandemic and maintain strong balance sheets. Asset quality decline did not occur as expected in the last two years, which allowed banks to release loan loss reserves; this trend will reverse in fiscal 2023 as reserves should be stable to growing. Bank earnings will also be pressured by slow recovering loan demand and higher labor and technology costs.

High yield corporate credit fundamentals will remain stable if the economy continues to grow but may begin to deteriorate if the economy weakens significantly. Default rates are expected to remain in the low-single digits in fiscal 2023. The level of defaults will depend on the strength of the economy. Corporate leverage is lower as companies have experienced improved cash flow and repaired balance sheets since the COVID-19 downturn; however, companies are facing increased borrowing costs due to higher interest rates.

Emerging market (EM) countries will continue to experience faster economic growth than developed markets, and EM countries' credit quality continues to benefit from relatively low public sector leverage and flexible exchange rates. However, the Russian invasion of Ukraine and COVID-19 lockdowns in China will likely impact growth in fiscal 2023. Inflation has been rising in EM countries and many EM central banks have responded by tightening monetary policy. In addition, increases in the U.S. dollar and U.S. interest rates may put pressure on EM countries with U.S. dollar liabilities.

STRATEGY

Overview

The core fixed income portfolio will begin with an active management risk of 27 basis points and will operate in the range of 20 to 120 basis points. The liquid treasury portfolio will have an active management risk operating range of 0 to 25 basis points. The following points summarize our outlook and portfolio strategy for fiscal 2023.

- The STRS Ohio economic forecast predicts a moderate economic growth environment, a reduction in inflation, and tighter monetary policy from the Federal Reserve.
- We have positioned the core portfolio with a current relative duration of 100.00%. Our strategy reflects the STRS Ohio economic outlook, the moderate economic recovery, and interest rates that appear fair relative to economic fundamentals.
- Regarding sector allocation of the core portfolio, we are maintaining an overweight position in U.S. Treasuries. We begin the year with an overweight position in investment grade corporates, high yield corporates, and emerging market debt but may adjust those positions as fundamentals and valuations evolve during the fiscal year. We are positioned underweight to agency mortgage-backed securities and expect to adjust our relative position as valuations evolve and the Federal Reserve's reduction of holdings in the sector provide potential opportunities to add to our position.
- We reserve an ample amount of active management risk capacity as we expect that as the economy evolves and the Fed raises interest rates and reduces its balance sheet, the market may present opportunities that lead to significant valuation changes and would prompt us to increase or decrease active management risk.
- The fixed income asset class has had $823 million in net redemptions fiscal year-to-date through April, with the core portfolio receiving a net contribution of $727 million and the liquid treasury portfolio receiving a net redemption of $1.55 billion.
- The total fixed income allocation is 17.2%, versus a neutral target weight of 21%. As a result of the recently completed 2022 asset-liability study, the neutral target weight for total fixed income will increase to 22% on Oct. 1, 2022. We expect to receive additional allocations during fiscal 2023 due to the asset-liability study.

Strategic Initiatives

- We continue to implement and review tactical and strategic opportunities including non-agency mortgage-backed securities, which is a non-index sector. We maintain a tactical position in non-index treasury inflation protected securities (TIPS) should inflation rise above expectations.
- The liquid treasury portfolio is positioned to provide funds for portfolio rebalancing and monthly cash flow needs of the total fund, especially during extreme events such as the market volatility associated with the COVID-19 pandemic in March and April 2020.
- The core fixed income portfolio will continue to review less liquid sectors and opportunistically provide liquidity in risk-off markets to earn an additional return premium.

Sectors

Treasuries

- During fiscal 2022, we moved from underweight to a slight overweight as the economic outlook became uncertain. We expect to begin fiscal 2023 overweight and will adjust the weight as opportunities in spread sectors develop.
- We have a tactical position in TIPS should inflation rise above expectations
- The liquid treasury portfolio (LTP) consists of high quality, liquid securities and has a market value of $3.2 billion, representing 3.5% of total fund assets.
  - The LTP neutral target allocation is 5% of total fund assets.
  - The marketability of the portfolio will remain high to maintain substantial flexibility in meeting the liquidity needs of the total fund — including benefit payments, asset allocation rebalancing and diversification.
  - We will focus on U.S. Treasury security selection, emphasizing relative value and efficient trade execution.

Government Related

- We continue to maintain a large underweight due to low yield spreads. We expect to remain underweight but will continue to monitor spreads and seek opportunities in both U.S. Agency securities and within other sectors of the government related portion of the Index.

CMBS (Commercial Mortgage-Backed Securities) and ABS (Asset-Backed Securities)

- We begin the fiscal year underweight CMBS as certain sectors of commercial real estate experienced deteriorating fundamentals since the onset of the COVID-19 pandemic. However, as the economy continues to reopen from pandemic restrictions, we expect many sector fundamentals to gradually recover. We will continue to monitor the sector for select opportunities. Multifamily fundamentals are favorable relative to other commercial real estate sectors, and we anticipate increasing exposure to Agency CMBS.
- We begin the fiscal year overweight ABS. Consumer credit fundamentals are constructive with the unemployment rate returning to pre-pandemic levels and household net worth as a share of disposable income at all-time highs. The surge in used car prices from supply chain constraints is beneficial for the credit quality of Auto ABS trusts. We will continue to monitor the sector for opportunities with an emphasis on strong issuers, structural credit enhancements, and high-quality collateral.

Mortgages

- We begin the fiscal year with an underweight in agency mortgage-backed securities (MBS). We expect prepayments to slow during the fiscal year due to a decline in refinancing and new mortgage activity as mortgage rates continue to increase in response to higher yields on treasury securities as the Federal Reserve continues to raise interest rates. The Federal Reserve's recent change in monetary policy has increased interest rate volatility and has negatively impacted MBS valuations.
- The Federal Reserve will allow its holdings of MBS to decline under its QT program. Under the QT program, mortgage paydowns will not be reinvested. It is also possible for the Fed to sell MBS bonds from its balance sheet to accelerate the decline of its MBS holdings. We will take advantage of opportunities if MBS offer attractive relative value because of this program.
- Our security selection process will focus on agency MBS pools with lower expected prepayment rates that are likely to provide stable cash flows at a reasonable valuation and a higher relative return. We plan to selectively add agency MBS bonds on a relative value basis as the year progresses.

Investment Grade Corporates

- We begin the fiscal year overweight investment grade corporates. Yield spreads have widened, reflecting uncertainty about interest rates, inflation, and the ability of corporations to maintain strong margins. investment grade corporates yield spreads have capacity to tighten, but headwinds have increased.

- We expect to maintain the overweight to investment grade corporates during fiscal 2023 and retain the ability to increase the overweight should yield spreads widen throughout the fiscal year.
- Our credit selection will be focused on companies with strong credit characteristics that will be able to maintain margins and profits during slower economic growth acknowledging that borrowing costs and input costs could move higher if inflation pressures do not moderate.

High Yield Corporates

- We begin the fiscal year overweight high yield corporates. Yield spreads reflect a credit environment with low default rates.
- We will adjust our high yield position as fundamentals and valuations evolve during fiscal 2023 and may reduce the overweight if the fundamental outlook deteriorates.

Emerging Market Debt

- We begin the fiscal year overweight emerging market debt. Yield spreads have widened and reflect risks to economic growth from tightening EM monetary policy, the Russian invasion of Ukraine and Chinese COVID-19 lockdowns.
- We may reduce the emerging market overweight during fiscal 2023 if yield spreads tighten or if the fundamental outlook deteriorates.

BOND STRUCTURE REPORT

(as of April 2022)

Portfolio	Market Value* ($ millions)	% of Asset Class	Portfolio Annualized Active Management Risk[1]	Portfolio Duration[2]	Targeted Relative Duration
Core Fixed Income	**$ 12,557**	**80%**	**27 bps**	**6.23 yrs**	**100.0%**
Liquid Treasury Portfolio	**$ 3,193**	**20%**	**2 bps**	**3.89 yrs**	**100.0%**
Total Fixed Income	**$ 15,750**	**100%**			

Core Fixed Income	Market Value* ($ millions)	Percent of Portfolio*	Yield	Relative to Index[3]
Treasuries	**$ 3,738**	30%	2.9%	1.04x
Government Related[4]	**$ 45**	0%	3.1%	0.06x
Mortgages[5]	**$ 2,689**	21%	3.7%	0.88x
CMBS & ABS[6]	**$ 401**	3%	2.9%	0.66x
Investment Grade Corporates[7]	**$ 3,964**	32%	3.8%	1.13x
High Yield Corporates[8]	**$ 720**	6%	7.0%	1.19x
Emerging Market Debt[9]	**$ 999**	8%	8.5%	1.16x
Total Core Fixed Income	**$ 12,557**	**100%**	**4.1%**	

Liquid Treasury Portfolio	Market Value* ($ millions)	Percent of Portfolio*	Yield
Treasuries	**$ 3,193**	100%	2.8%
Total Liquid Treasury	**$ 3,193**	**100%**	**2.8%**

***Market Values for April 30, 2022, are preliminary.**

***Market Value and Percent of Portfolio columns may not add due to rounding.**

[1] A statistical model is used to generate annualized active management risk, which is an estimate of the expected difference in annual performance between the portfolio and the index. The Core Fixed Income Portfolio currently has an annualized active management risk of 27 basis points, meaning the performance of the portfolio relative to the index is expected to be within 27 basis points for 68% (one standard deviation) of all market outcomes.

[2] A measure of the sensitivity of the price of the fixed income portfolio to a change in interest rates, expressed in years. The current Core Fixed Income Portfolio duration of 6.23 years implies the average price of the portfolio is expected to rise by 6.23% for a 1% (100 basis point) decline in interest rates and is expected to fall by 6.23% for a 1% (100 basis point) increase in interest rates. The portfolio duration relative to the index, currently at 100.0%, is the portfolio's duration divided by the duration of the index. A number less than 100% implies the portfolio has a duration less than that of the index and reflects an expectation of rising rates.

[3] The relative exposure to each sector versus the index, based upon market value and duration. A number greater than 1.00x indicates an overweight, and reflects a sector that we believe is undervalued. A number less than 1.00x indicates an underweight, and a sector we believe is overvalued.

[4] Consists of U.S. Government Sponsored Enterprise debt and other highly rated non-corporate debt.

[5] Mortgages are secured by a diversified pool of loans on residential properties.

[6] Commercial Mortgage-Backed Securities (CMBS) are secured by a diversified pool of loans on commercial property such as office buildings, industrial complexes, retail centers, hotels and multifamily developments. Asset-Backed Securities (ABS) are secured by diversified pools of consumer loans, including credit card receivables and auto loans.

[7] Consists of debt from industrial, utility and financial institution issuers that is rated investment grade, which is Baa and above.

[8] Consists of debt from industrial, utility and financial institution issuers that is rated non-investment grade, which is Ba and below.

[9] Consists of bonds issued by sovereign, quasi-sovereign, and corporate emerging market issuers. Country eligibility and classification as Emerging Markets is rules-based and reviewed annually using World Bank income group and International Monetary Fund (IMF) country classifications.

6. Domestic Equities Investments

OUTLOOK

Equity Market Return Expectations

For fiscal 2023 we forecast total returns to be in a range of –7% to +23%, with a central S&P 500 target of 4500 (+10.3% on a total return basis), above the STRS Ohio policy return of 6.60%. Key factors behind this forecast are:

- Slowing, but still positive earnings per share growth
  - Continued economic growth, albeit at a slower rate than last year for core economic activity
  - Wage and input inflation, combined with rising rates, pressuring operating margins
- Price to earnings (P/E) multiples are likely to be flat to lower
  - P/E multiples are marginally above the normal range
  - Rising long-term interest rates (1.50%–4.00%) may put pressure on valuations
- Potential Risks
  - Higher inflation, both input costs and potential demand destruction
  - A Federal Reserve policy mistake
  - The evolution of the COVID-19 pandemic and any associated economic shutdowns
  - Escalation of the Russian invasion of Ukraine
  - Further supply chain disruptions

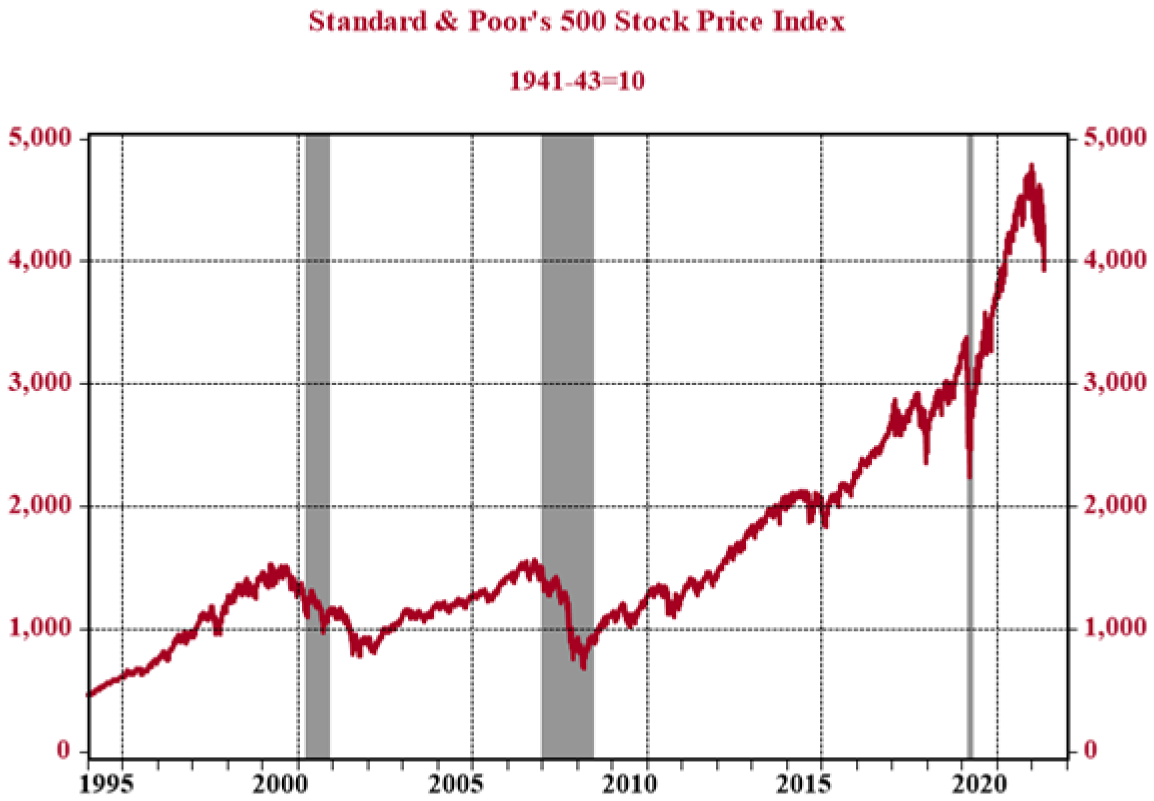
Summary of 2022

The U.S. equity market was a tale of two halves in fiscal 2022. The first half of the fiscal year saw a continuation of the gains seen in fiscal 2021. In the first six months of the year, the market was buoyed by strong earnings growth and continued easing of COVID-19 restrictions. The S&P 500 Index gained 12.4% for the first half of the fiscal year to an all-time high of 4796.56 on Jan. 3, 2022. The second half of the fiscal year saw a large increase in inflation, especially in food and energy. Prices of oil and food spiked even higher as Russia invaded Ukraine early in the calendar year. The Federal Reserve signaling a move to a more hawkish monetary policy increased investor fears of a potential economic slowdown resulting in a market correction. As of April 22, the S&P 500 closed at 4271.28, down more than 10% from the market highs and essentially flat for the fiscal year.

Performance was strongest for the energy sector (+46.9%) as oil increased sharply due in part to the Russian invasion of Ukraine, combined with a shortage of supply due to many years of underinvestment. Besides energy, defensive sectors performed the best as investors sought the safety of less economically sensitive stocks. The safe-haven utilities (+20.2%), consumer staples (+17.1%), and healthcare (+7.4%) sectors performed well during the year. The communication services (–21.3%) sector was the was the worst performer, followed by the cyclical consumer discretionary (–3.0%), industrials (–2.8%), and information technology (–2.6%) sectors.

Large capitalization stocks outperformed small caps in fiscal 2022, and value stocks outperformed growth stocks over the period.

S&P 500 PRICE INDEX



Source: Standard & Poor's

Note: Shaded areas denote recession.

Economic Drivers

Economic growth is expected to slow during fiscal 2023 but still remain positive. Labor shortages and wage inflation became a concern over the past year and will likely continue into 2023. While some of the supply chain bottlenecks and shortages of certain components/materials are beginning to ease, there may be continued disruptions in the upcoming fiscal year. The reversal of monetary stimulus to tightening will likely be the biggest headwind for the market during the fiscal year and could disrupt the economy into fiscal 2024. Inflation, especially in energy and food, could lead to slowdowns in consumer spending and potential demand destruction.

Earnings

Earnings uncertainty is high for fiscal 2023 as revenues should grow but may be offset by increased inflation of input and wage costs. Using our central economic forecast as a guide, earnings per share for the S&P 500 is expected to show strong growth in 2023, increasing approximately 9.3% to $235.

S&P Operating EPS	FY 2021	FY 2022 (est.)	FY 2023 (est.)
STRS Ohio Forecast	$176	$215	$235
EPS Growth (YoY)		+22.2%	+9.3%
Consensus Forecast	$176	$216	$239
EPS Growth (YoY)		+23.2%	+11.1%

Revenues for the S&P 500 are likely to grow albeit at a slower rate. Revenue headwinds may come from a slowing economy, demand destruction due to higher prices and an inability to acquire certain inputs due to material shortages. Margins will compress as companies are forced to deal with rising labor and other input costs.

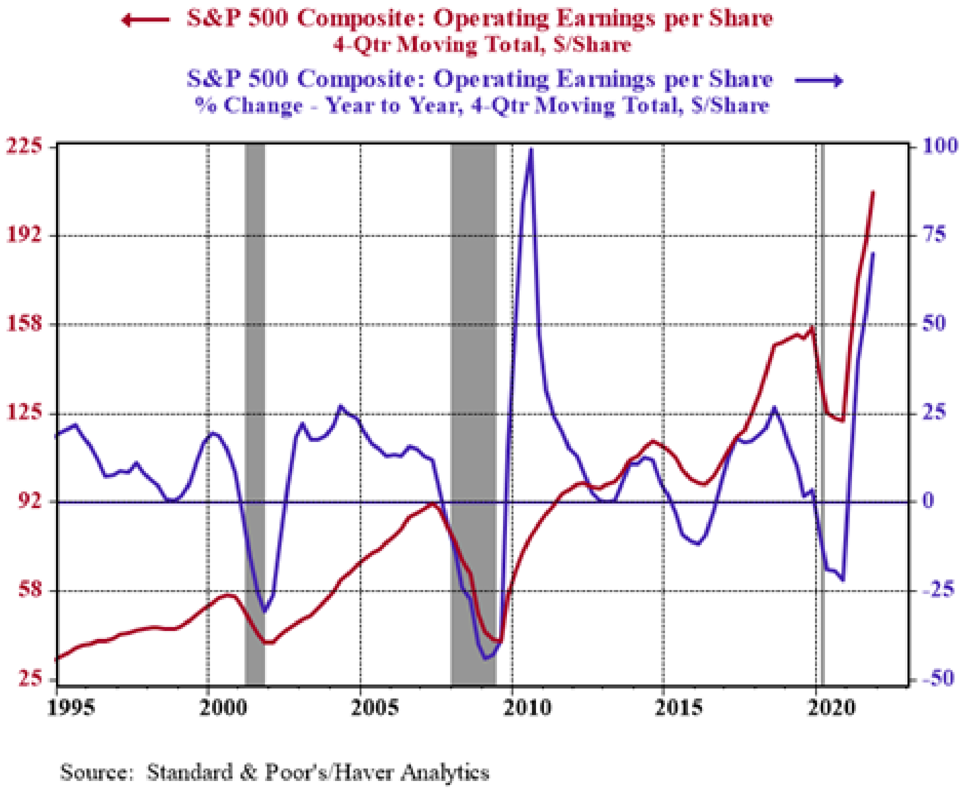
While bank earnings could see a benefit from an expected rise in interest rates, overall earnings for financial companies will fall as they will no longer gain from reversals of loan-loss provisioning and capital markets activity may also decline.

Some travel-related industries such as airlines, cruise lines and hotels should see a strong earnings recovery in fiscal 2023 as consumers have pent-up demand for travel. Other companies such as brick-and-mortar retailers, who have been losing market share to ecommerce retailers for several years, will now be faced with a shift in consumer spending toward services from goods.

Oil prices rose sharply in fiscal 2022 driven by global reopening and supply disruptions caused by the Russian invasion of Ukraine. We expect the energy sector to perform well in 2023 as the sector has had a decade of consolidation and deferred capital expenditures, both of which capped supply growth and result in elevated oil prices.

The following charts show a sharp drop of operating earnings in 2020 and the rapid recovery of operating earnings and operating margins through the third quarter of fiscal 2022. The fourth quarter data of the fiscal year will show even higher operating earnings and operating margins.

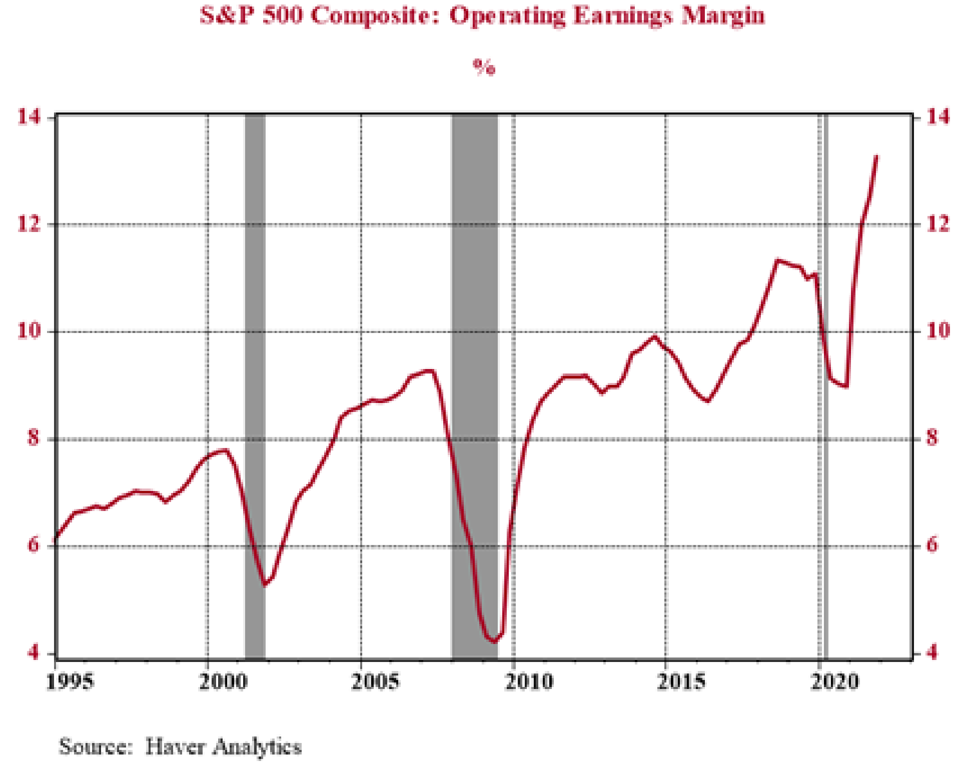
S&P 500 OPERATING EARNINGS



Source: Standard & Poor's/Haver Analytics

Note: Shaded areas denote recession.

S&P 500 COMPOSITE: OPERATING EARNINGS MARGIN



Source: Haver Analytics

Note: Shaded areas denote recession.

With respect to capital allocation, we expect companies to use free cash flow to grow their businesses and return capital to shareholders via buybacks and dividends. Capital expenditures may level out as corporations digest margin pressures due to rising input costs and interest rates. In addition, tightening Fed policy should result in more economic uncertainty. We expect technology investments to continue as companies reduce costs and improve efficiency. Business should also continue to onshore manufacturing and supply chains from China and other countries to secure the availability of product inputs.

Valuations

The S&P 500 is currently trading at 19.2 times trailing 12-month operating earnings and 17.6 times forward earnings estimates. Valuations are above the historical average of 16 times earnings. Investors will continue to watch the earnings trajectory in 2023 as optimistic expectations are priced into valuations. The P/E ratio is likely to decline in 2023 due to increasing interest rates. Other possible risks to valuations on the downside would be another wave of COVID-19 cases, less corporate-friendly policies from the U.S. government, high inflation or possible geopolitical uncertainty. Higher valuations could occur if the global economic activity grows at a more rapid rate than we are forecasting, and inflation and interest rates remain contained.

Forecast

Under the central economic forecast, we would expect an operating range for the S&P 500 to be 3800–5000 with a point estimate target of 4500. This target is based on a P/E multiple expectation of 19 times the earnings estimate of $235. Under alternative scenarios, a slightly decelerating U.S. economy with benign inflation could drive earnings to $250 and the market to new highs above 5300. Should the U.S. economy experience another recession, earnings could fall to $180 or below — resulting in the S&P 500 at 3250 or lower. Tightening Fed policy has increased the probability of the downside scenario resulting in a more bifurcated view and a wider expectation of outcomes than is normal. The following table illustrates these scenarios (all estimates are approximate and may be rounded for simplicity).

	Earnings	Multiple	Target	Total Return
Base Forecast	$235	19	4500	+10.3%
Operating Range			3800–5000	–7% to +23%
Upside Case	$250	21	5300	30%
Downside Case (recession)	$180	18	3250	–20%

STRATEGY

For fiscal 2023 we have a positive outlook on the equity markets, resulting in returns that will be above the policy return. Currently, domestic equities represents 28.0% of total assets, equal to the current neutral target weight. With the new asset allocation study the target weight will fall to 27% on July 1, 2022, and 26% on Oct. 1, 2022. We would expect to remain close to the neutral target weight throughout the transition and the fiscal year as our expected returns are fairly close to normal.

Our equity allocation is evenly balanced between value and growth factors. The valuation spreads that existed last year have narrowed significantly and do not represent an opportunity at this point. We are slightly overweight small cap due to its cheaper valuations.

We expect volatility to remain elevated during this fiscal year, as economic uncertainty is elevated with the Fed raising rates. This elevated volatility could result in opportunities to adjust our weighting to take advantage of market moves.

Strategic Initiatives

We will continue to closely monitor the performance of all of our domestic portfolios — particularly those with weaker longer-term records. We will also continue to examine our external managers to determine if any changes need to be made to improve the domestic equities structure and performance.

Similar to last year we will continue to look for new equity replacement strategies that can replace some of our passive exposure and/or improve our risk/reward balance.

7. International Investments

OUTLOOK

In fiscal 2022, the international markets are recording negative returns. Valuation multiples contracted as markets began to discount the impact from higher interest rates required to address elevated inflation. The MSCI World ex-US (50% Hedged) Index for developed markets has decreased 3.9% through the end of April, while the MSCI EM Index for emerging markets has decreased 20.3%. As a result, the International Blended Benchmark — consisting of 80% of the MSCI World ex-US (50% Hedged) Index return and 20% of the MSCI EM Index return — combined represents a decrease of 7.4%. At this writing, staff anticipates total returns earning below normal levels in fiscal 2023.

Developed Markets

Although the developed markets posted a moderate positive return in the first half of fiscal 2022, a downturn began in January 2022. The weaker markets in the second half of fiscal 2022 were primarily due to heightened inflationary pressure and the Russian invasion of Ukraine, just as many countries were on a normalization path toward a full reopening after the pandemic moderated. Looking ahead, aside from inflation, geopolitical conflicts and potential COVID-19 resurgence, negative earnings revisions pose meaningful risk to developed markets performance. The earnings outlook appears increasingly uncertain as comparisons to year-ago results become more difficult, supply chain disruptions and high input costs appear unlikely to abate quickly, and wage inflation could escalate. Consensus forecasts expect mid-single-digit earnings growth for fiscal 2023 on the heels of a strong 30% plus earnings recovery for fiscal 2022. This continued earnings expansion is largely predicated on peak profit margins that appear highly vulnerable in the face of high commodity prices and an uncertain demand outlook. Further, with global central banks entering various stages of the tightening cycle, the rising cost of capital will continue to exert downward pressure on valuation multiples. The –3.9% total return for the 50% hedged benchmark through the end of April was five percentage points higher than the unhedged benchmark due to the U.S. dollar strengthening against major developed market currencies. This U.S. dollar strength is expected to be supported in the near-term by additional policy rate hikes in the United States. However, the U.S. dollar appears overvalued on a purchasing power parity basis and is susceptible to a correction by the end of fiscal 2023. After considering all these factors, the total return forecast in developed markets for fiscal 2023 is for a positive return that is below normal.

Japan’s Prime Minister Fumio Kishida secured his position after the autumn 2021 general election. He has risen to success by building consensus and pursuing policies popular with the public, such as a conservative stance on COVID-19. With the opposition parties in turmoil, Kishida’s ruling Liberal Democratic Party is in a comfortable position for the upper house elections in July 2022. Short of unexpected changes, the political landscape looks to be calm in fiscal 2023 as the next general election is not until 2025.

The deflationary pressures that have persisted in Japan may be about to change for the first time in many years. Japanese firms are now facing significant cost pressures from imported commodity price inflation that has been exacerbated by the weakest yen-dollar exchange rate since the early 2000s. The divergent monetary policies between the U.S. Federal Reserve and the Bank of Japan have led to over 10% depreciation of the yen versus the dollar since the beginning of fiscal 2022. Absent external pressure, the Bank of Japan remains committed to keeping the policy interest rate close to zero and appears willing to let the yen drift. Although its valuation has become more attractive relative to its 10-year history, the Japanese market returns to U.S. investors would be reduced by any additional yen depreciation.

In the United Kingdom, Prime Minister Boris Johnson has been pressured to resign after it was revealed that he attended a party in violation of the COVID-19 regulations. Nevertheless, he is likely to survive until the next general election in May 2024, since his Conservative Party maintains its majority in Parliament and few wish to rock the boat in this tumultuous geopolitical and economic environment.

The Bank of England has been at the forefront of rate increases, having increased its base rate by 90 basis points from December 2021 through May 2022 and will continue to tighten in fiscal 2023. However, expectations are that the U.S. Federal Reserve will raise rates much more aggressively than the Bank of England, leading to a weakening of the pound. A high share of basic material and energy companies has allowed the United Kingdom market to outperform in fiscal 2022 through April, causing its valuation gap with the developed market peers to reverse. With the robust earnings growth forecast contingent upon strong commodity prices and aggregate valuation at average levels, the United Kingdom market appears less attractive than it has been in prior years.

Eurozone economic activity rebounded as the region emerged from COVID-19-related lockdowns. However, the recovery slowed in recent months due to energy cost spikes and supply chain constraints. The Russian invasion of Ukraine not only casts the greatest security threat to Europe since World War II, but also exacerbated the energy situation given the continent's high dependence on Russian energy. Under this highly uncertain economic and political backdrop, the European Central Bank is expected to be much more cautious with its monetary policies than the U.S. Federal Reserve. The European Central Bank is expected to begin tightening no sooner than summer 2022, potentially ending the asset purchase program and lifting the key deposit rate from negative 50 basis points over time.

Germany appears most vulnerable to an energy crisis since the country depends on Russia for over one-third of its gas supply, and replacing such a large quantity takes time. Whereas the war has jolted Germany into significantly boosting its defense budget, the new government led by Chancellor Olaf Scholz can ill-afford to take truly impactful actions against Russian gas supply in the short term. As headline inflation reached a multi-decade high of 7.4% in April 2022, Germany could be at the brink of a wage cost spiral, with unions such as IG Metall recently demanding an 8.2% pay raise for 76,000 steel industry workers. While wage settlements tend to be around 50% of unions' initial claim during normal times, the surging inflation is far from normal, and the tight labor market is affording the unions more bargaining power. Market participants have noted anecdotal evidence of companies starting to compensate workers for higher inflation on top of collectively agreed pay, and some highlight clear risk that the projected 3.5% increase in 2022 effective wages may be too low. Reflecting heightened geopolitical and economic uncertainty, the German market is trading at some of the highest discounts against its own 10-year history and peers.

In France, Emmanuel Macron won the April 2022 election to become the first President to be re-elected in 20 years. His administration will continue to focus on fiscal stimulus to help households cope with high inflation. He will also work toward implementing reforms of the pension and unemployment systems, while introducing measures to stimulate investments in innovation and infrastructure. Successful implementation of his agenda may depend on a strong performance by his party in the legislative elections for the National Assembly, scheduled for June 2022. Whether or not Macron's party wins an absolute majority, he will face execution risks, possibly inviting protests against the rising cost of living, as well as pension and unemployment system reforms. The French market is trading at average levels relative to its 10-year history and developed market peers, with a number of luxury goods companies exhibiting better pricing power and resilience to margin pressures.

Italy's President Sergio Mattarella accepted another term in January 2022 which extended political continuity in Italy, allowing prime minister Mario Draghi's government to work on the economic recovery and resilience plan without the threat of an early election. Draghi intends to focus on providing support for infrastructure investment, as well as passing structural reforms related to the judicial system and taxation. The government must work quickly to pass the reforms ahead of the next parliamentary election scheduled to take place by June 2023. While its equity market appears cheap relative to developed market peers, Italy is heavily reliant on a manufacturing sector contending with rising input costs, supply chain uncertainties, as well as high dependence on Russian energy supply.

Spain's governing coalition of far-left and center-left parties seems stable at present, with the next general election not scheduled until December 2023. To offset the spike in energy prices, the government lowered taxes on energy, introduced caps on gas prices, and raised transfer payments to low-income households. After suffering the greatest negative GDP growth rate in major eurozone countries due to COVID-19, the economy is expected to bounce back, driven by a gradual recovery of the important travel and tourism industries. The Spanish market is trading in line with its 10-year historical averages, with better earnings growth expectations coming from sectors that are expected to benefit from a rebound in global travel.

In Australia, federal elections were held in May 2022. Anthony Albanese became only the fourth Labor Party leader since World War II to be elected Prime Minister. He ran his election with a promise of swift actions on climate change, gender equality and wage growth. It remains to be seen how Albanese's administration will shape the course of the country's economy or its rocky relationship with China. The Australian market has outperformed the developed markets benchmark in fiscal 2022 through April due to strong commodity prices and a more insulated domestic economy, with valuation levels at meaningful premiums relative to its 10-year history and peers.

In Canada, prime minister Justin Trudeau secured his term until 2025 by calling a snap election in autumn 2021, but his Liberal Party did not win enough seats for a majority government. Instead, the liberals set a record for the lowest vote share of a governing party, further weakening its power. This comes at a time when Canada is fighting the highest inflation in over two decades. Having already raised benchmark interest rates by 75 basis points in calendar 2022 through April, the Bank of Canada is expected to be more aggressive with rate increases than other developed market central banks. Supported by strong commodity prices, Canada's resource rich equity market appears unattractive relative to its 10-year history and developed market peers.

Emerging Markets

The emerging markets return of –20.3% through April in fiscal 2022 was materially worse than the developed markets return. Unlike the developed markets that had an overall positive return through the first half of fiscal 2022, the emerging markets already were declining through December. The weakness in emerging markets in the first half was driven by regulatory pressures on internet-related stocks in China, inflation containment measures that included policy interest rate hikes in several countries and currency depreciation versus the U.S. dollar. These same negative factors continued in calendar 2022, while the Russia invasion of Ukraine and additional concerns about fundamentals in China contributed to a worsening outlook. Staff forecasts that the emerging markets in fiscal 2023 will earn a total return that is slightly positive but below normal.

The emerging markets valuation on both trailing and forward price/earnings multiples is lower than the historical average for the past ten years. The current price/book multiple is near the 10-year average despite the trailing return on equity hovering close to a 10-year high. The emerging markets valuation multiples remain at discounts relative to the current levels in the developed markets. Staff expects the magnitude of valuation multiple contraction in emerging markets to ease in fiscal 2023 with the main forecast concern being the possibility of negative earnings growth. Earnings could be pressured if rising costs harm corporate profitability and/or by a prolonged economic slowdown in China due to closures associated with the country's restrictive zero-COVID-19 policy.

Despite China having one of the worst returns in the emerging markets in fiscal 2022, the country remains the largest in the benchmark with a nearly 30% weighting. Several other emerging market countries have economies with significant export exposure to China. Therefore, the market outlook for emerging markets is reliant on fundamental developments in China. China's economic growth is decelerating, but the government has not withdrawn its 5.5% real GDP growth target for calendar 2022. The zero-COVID-19 policy has resulted in closures in Shanghai and elsewhere that are important economic regions. Since the government reconfirmed its intention in early May to continue its zero-COVID-19 policy, some investors are anticipating a significant fiscal stimulus program to be announced to help businesses and consumers. With President Xi striving to be reappointed for a third term at this autumn's 20th National Congress of the Chinese Communist Party, the zero-COVID-19 policy possibly will continue at least through that period. Therefore, targeted fiscal support measures might be required, but policymakers will need to balance these with their objective to avoid another round of debt leveraging and property bubbles.

Developments in Russia's invasion of Ukraine will also be key to the outlook for emerging markets. A continuation or escalation of the current battle will prolong the supply chain issues and higher costs for customers previously dependent on imports from the region, while commodity exporting firms from other countries should continue to benefit from higher prices for their products. Any cessation in active, unrelenting war maneuvering by Russia could improve investor sentiment but it is difficult to have confidence that a stalemate in negotiations would be avoided.

The elevated energy and food inflation across the emerging countries could have destabilizing effects on incumbent governments. Staff has been monitoring the populism trend in emerging markets for several years. There has been a movement within some Latin America countries to reverse pro-market policies but on balance these attempts have not resulted in highly impactful measures. The most important event in Latin America in fiscal 2023 will be a general election in Brazil to be held in October 2022 to elect a President and the National Congress.

STRATEGY

As fiscal 2022 draws to a close, the international portfolio at this writing is approximately $21.3 billion or 23.2% of total assets (includes 0.7% of total assets in global equities), slightly higher than the neutral target weight of 23%. The international asset class weighting did not deviate materially from the 23% neutral target throughout fiscal 2022. As markets declined, rebalancing activity was initiated to allocate capital to manage toward the neutral target weight and thus led to a net cumulative flow of funds into the asset class of $1.0 billion through April 2022. Staff is projecting a below normal total return for the International Blended Benchmark for the next 12 months, so the international asset class weighting will likely be held near a neutral position versus the policy target weight in fiscal 2023 unless the risk/reward outlook becomes more favorable.

Value stocks in fiscal 2022 continued a second consecutive fiscal year of outperformance versus growth stocks. The overall international portfolio was tilted toward the value style and thus was well positioned to record relative outperformance versus the International Blended Benchmark. Although valuation spreads between value and growth stocks could still compress in value's favor in fiscal 2023, the economic cycle is moving toward late stages when it can become difficult for value to outperform if the markets begin to discount a global recession. Staff will evaluate the economic conditions and market environment as fiscal 2023 progresses in order to determine how to position the international portfolio.

The 2022 asset-liability study lowered the target allocation for international equity by one percentage point. The new 22% policy weighting will be fully phased-in on July 1, 2022. Staff plans to lower the actual weighting in the asset class to approach the neutral 22% target by the end of June 2022.

The chart on the next page shows the estimated allocations for assets internally managed, externally managed, developed and emerging markets investments at the end of fiscal 2022. We will be near an 82%/18% split between the developed and emerging markets within the asset class, which compares to the 80%/20% neutral points set for each. Staff anticipates that the developed/emerging split will move closer to the neutral points in fiscal 2023 once there is evidence that China's economic deceleration has stabilized and the zero-COVID-19 policy is materially adjusted. As shown below, the split between internally and externally managed funds is 53% internal and 47% external.

FISCAL YEAR-END 2022 (estimated)	$ Invested (at Market)	Percent of International Assets
Internal Managers	$10,901 million	53%
External Managers	$ 9,690 million	47%
	$20,591 million	**100%**
Developed Markets	$16,818 million	82%
Emerging Markets	$ 3,773 million	18%
	$20,591 million	**100%**

As of April 30, 2022, $661 million is in a global portfolio. This portfolio is not included in the table above due to the fact that it includes developed, emerging, and domestic equity securities.

Strategic Initiatives

Staff previously communicated a strategic initiative to increase the capacity to allocate to growth-style portfolios. Staff issued a request for proposal (RFP) in the fourth quarter of fiscal 2022 to search for international large-cap growth managers with strategies investing across both developed and emerging markets. After proposals are received, due diligence will be conducted during the first and second quarters of fiscal 2023 with selection, contract negotiation and funding targeted to be completed by December 2022.

Staff also previously communicated an objective to create an international analyst portfolio with active stock selection by the international analyst team that will hold more growth-style stocks than the current internally managed fundamental portfolios that have a value-style bias. Groundwork continues to finalize the preparation for this portfolio with a tentative target date to initiate the portfolio on July 1, 2022.

The research project that started in fiscal 2022 to study the risk and return benefits to adding China A-shares as a standalone mandate for an external manager concluded with little staff conviction to proceed to an RFP stage. The project team plans to reassess again early in calendar 2023 when regulatory developments associated with China's common prosperity objective can be evaluated for another year. Staff will also be able to observe external manager relative performance results in calendar 2022 following a difficult performance year in 2021 for most of the A-share strategies that were evaluated. China's risk profile was further elevated by the heightened global geopolitical tension emanating from the Russian invasion of Ukraine. This additional complicating factor requires careful consideration when the project team reconvenes.

Staff continues to closely monitor the performance of all the international portfolios. The global quantitative portfolio will be terminated with some of the assets likely to be transferred to other portfolios. After the large-cap growth external manager hiring is completed in calendar 2022, the internal/external manager platform will offer the flexibility to make allocation changes as necessary when market conditions change. Looking at the portfolio from a risk budgeting standpoint, the highest amount of risk continues to come from the external managers. A lower amount of risk is coming from the internal managers, which is partly due to the passive core-EAFE component (i.e., Europe, Australasia, Far East). The other internal portfolios are being managed actively. Staff will continue to monitor and evaluate the proper allocation of risk across the international portfolio

8. Real Estate Investments

OUTLOOK

Overview

Fiscal year, through March 31, 2022, the real estate blended benchmark return stands at almost 17.1% and will finish the fiscal year above this point. This outperformance compared to trend was due to shrinking capitalization rates (cap rates) with the backdrop of economic expansion. While private real estate is expected to continue a positive trend, albeit moderating in the current quarter, the public (REIT) markets look to be flat as they have already moderated after a strong start to fiscal 2022. The net result will keep the fiscal 2022 blended benchmark well above its long-term target. In fiscal 2023, staff anticipates the blended benchmark total return will be at or slightly above the Retirement Board's long-term expected return for the asset class of 5.75%.

Public market real estate has returned almost 13% fiscal year to date through March; this was driven by an exceptionally strong first half of fiscal 2022 that masked a negative 3.9% return in the third fiscal quarter. Staff anticipates public market returns will finish the fiscal year close to where they stand today.

As of March 2022, the total return for private market real estate, as measured by NCREIF Property Index (NPI), is 17.6% fiscal year to date — well above the 3.5% return at this time last year. Appreciation has been running at record pace after it had been decelerating over the last few years. Staff anticipates the NPI to end the fiscal year in the low 20% range.

Transaction volume for the January to March quarter was 56% ahead on a year-over-year basis, continuing the strong rebound recorded in the previous calendar year. Preliminary information from April and May indicates a less robust completion of the current fiscal year due to interest rates and geopolitical uncertainty.

Cross-border investment was up 92% in calendar 2021 vs. 2020. With $71 billion of activity, this compares to the recent peak of $100 billion in 2015. This represents only 9% of total investor activity in the United States compared to the recent high of 18% in 2015 according to RCA and is below the long-term average of 12%. Calendar year 2021 was a strong year; however, the less than average percentage of the total activity was due to the denominator effect of the robust domestic activity.

With interest rates moving off historic lows, overall cap rates have yet to move in a meaningful way — but it may be too early to get indications of this as of this writing. Early indicators that are precursors to cap rate movements include buyer tours and offers on properties offered for sale. This activity has recently decreased. Through December 2021, spreads to 10-year U.S. Treasury yields widened significantly due to the previous declines in interest rates. With the 10-year U.S. Treasury now in the 3% range, the spread to treasuries has come in to the point where it is now tighter than the long-term averages but not at historic lows reached prior to the global financial crisis.

Through March, fiscal year-to-date total return for REITs stands at a positive 12.9% versus 23% for the same period last year. The rise in the 10-year U.S. Treasury yield, which closed near 3% at the end of April 2022, has put pressure on the higher multiple sectors, namely: industrial, storage and apartments. The most notable movers during the second half of fiscal 2022, have been the industrial REITs, which have seen negative 25.6% performance (through May 12, 2022) vs. the FTSE NAREIT Index at negative 18.52% year-to-date. The industrial REITs, which were the main sector to benefit from COVID-19 lockdowns, have seen increasing valuation concerns. The outperformers during the second half of fiscal 2022 are hotel REITs, shopping center REITs and office REITs as a return to pre-pandemic activity has benefitted these sectors and led to relative outperformance. Shopping center REITs have largely recovered to their pre-pandemic valuation levels and are now reporting record leasing pipelines. Shopping center tenants have been taking advantage of COVID-19-induced market vacancy to build out their retail network. Hotel REITs have posted revenue per available room above pre-pandemic levels driven by strong average daily rate growth from the leisure segment. Office REITs have outperformed on a relative basis year-to-date, benefitting from lower expectations coming into the year; however, concerns remain on how work-from-home and hybrid work models will impact future leasing decisions. Staff expects public market returns to mirror private market returns in the coming year.

Property Markets

The effects of the global economic shock due to the pandemic response have had less of an impact on real estate fundamentals this past year. Retail bore the brunt of the pandemic and has recovered nicely with bricks and mortar store sales exceeding pre-pandemic levels. The immediate effects on other property types have been somewhat insulated in the near term due to the predominance of long lease terms and higher credit tenancy. For office buildings, the way new hybrid working patterns may affect leased and occupied space remains an unresolved issue. Industrial has benefited from onshoring and e-commerce and vacancies are at all-time lows. Apartment markets have recovered with significant rent increases in place in most markets.

Capital markets have recovered. Money center bank balance sheets are strong with record reserves. Outstanding commercial mortgages are flat, but life company mortgage commitments have returned to pre-pandemic levels. Mortgage loan coverage ratios are high and loan-to-value ratios are near historic lows, indicating that underwriting standards remain conservative since the global financial crisis. Multifamily volumes are up 23% from the preceding calendar year.

Traditional brick and mortar stores staged a strong rebound from pandemic lows and now account for 87% of all retail sales. Internet sales dropped from an all-time high of 15.7% in the second quarter of 2020 to the current 12.9%, signifying a reversion to traditional shopping patterns. This has all occurred with the backdrop of shrinking retail space compared to historic norms. Some retail space has been removed from the market due to obsolescence. However, new supply has also been on a steady decline since peaking in 2008. Retail construction now stands near the 30-year low in current dollars. This combination has drawn some investor interest into retail, especially necessity-based retail. Ecommerce is expected to continue to grow at the long-term average of 15% per year, but traditional retail appears to be on more solid footing after weathering the significant effects of the pandemic.

The NPI industrial sector posted 11.5% and 13.5% returns during the first two quarters of fiscal 2021. This is nearly double the next closest property type — retail. Industrial was the main contributor to NPI's record return in the second quarter of fiscal 2022. Property market fundamentals and capital markets underwriting parameters were both major contributors to this strong performance. Cap rates declined to all-time lows, as a result of investors expecting underlying rental growth strength in the sector. Investors were underwriting rental growth rates well above the long-term averages and were willing to accept lower initial returns for the hope of projected large future increases in income. This expectation is founded in projections of increased demand for space. Linneman and Associates expects demand for new space to be three times the historical average for the next decade due to ecommerce, onshoring of supply chain and other factors.

Apartment rents were at or just above the 20-year average prior to the pandemic. After a slight pandemic-induced drop, rents have recovered and are now 5.4% above the 20-year mean in real dollars according to Costar. This trend is expected to continue as apartment vacancy recorded by the Census Bureau is now 200 bp below the long-term trend since 1965. Apartment demand is generally correlated with job growth. This persistence of demand is expected to remain in place due to projected continuance of job growth. The supply of new apartments is also still recovering from the dearth of new supply that was not added in the years following the global financial crisis (GFC). These factors, as well as the underlying demographic trends, have led to high levels of investor interest in the apartment sector.

The office sector has lagged the other three sectors and has a 5.24% return fiscal year to date. Office leasing has picked up and vacancies decreased slightly in the past year; however, most of the activity has been with smaller tenants. Large tenants are still displaying a reluctance to make long-term leasing decisions until they can determine the impacts of hybrid work trends. McKinsey reports that 52% of the companies recently polled want to mandate employees be in the office 4–5 days per week as they see other parts of society (e.g., sporting events, dining out, travel) returning to pre-pandemic activity levels. As of February, Kastle Systems recorded that just 37% of office workers had returned to the office compared to pre-pandemic levels. The South has led the back-to-office trend with nearly 50% of the Texas market employees back in the office. There has also been a bifurcation between new, high-amenity office environments being in demand versus traditional, older office buildings with more limited leasing interest. Corporations are clear that they need amenities to attract workers back to the office. The work-from-home trend clearly still has some way to go to reach clarity after more than two years of uncertainty. Even with the uncertainty, transaction volume and pricing have been on positive trends. Cap rates have been dropping for suburban office while remaining stable for central business district buildings.

Returns

Staff anticipates the blended benchmark total return for the asset class in fiscal 2023 to be at or slightly above the Retirement Board's long-term expected return of 5.75%.

After six calendar years of double-digit returns through 2015 for the NPI, the longest on record, returns had been decelerating to single-digit total returns in a measured manner — with fiscal 2020 and 2021 returns affected by the pandemic. The historically strong appreciation returns in the most recent quarter have given the NPI its most robust year-to-date performance in over a decade, with an almost 22% trailing one-year return. We expect NPI Total returns in the current fiscal year to finish in the low 20% range. Fiscal 2023 will likely continue the positive NPI Price return trend for the beginning of the year and begin to decelerate thereafter. Staff expects Total NPI for fiscal 2023 to be in the 6%–7% range. The table below demonstrates the changes in private real estate returns during the last three years as of March 31, 2022. The NPI represents 85% of the STRS Ohio Real Estate Blended Benchmark.

NCREIF PROPERTY INDEX (NPI)

One-Year Ending	Income	Price	Total
March 31, 2022	4.2%	17.2%	21.9%
March 31, 2021	4.1%	(1.5)%	2.6%
March 31, 2020	4.5%	0.7%	5.3%
Three-Year Annual Average	**4.3%**	**5.2%**	**9.6%**

Real estate returns are driven by both the underlying property fundamentals, through cash flow, and the capital market valuations that incorporate return expectations and assumptions regarding future cash flow growth. Since the inception of the NPI (1978) calendar year, the capital market component has represented just about 20% of the average total return, with the income component being the primary appeal of real estate.

The secular decline in 10-year treasury rates since a high in 1984 has afforded room for significant cap rate compression and thereby appreciation for the asset class. This long-term correlation has caused some investors to believe that the recent climb of the 10-year U.S. Treasury to nearly 3% from a pandemic low 0.6% would have a strong negative effect on real estate values. However, the recent sharp drop in treasuries during the pandemic to historic lows had a muted effect on cap rates. Cap rates did decrease but did not follow lock step down with the 10-year U.S. Treasury, and spreads actually widened to twice the long-term average spread. This divergence, as well as the recent disconnects in the 2006–2007 period and the 2008–2009 period have led researchers to determine if something other than interest rates affect real estate values. Cheraahidze & Wheaton (2013) and Linneman (2015) developed models that better predict cap rate movements than the 10-year U.S. Treasury. These models are based more on capital flows into real estate than solely relying on interest rates.

Currently there is still an abundance of capital available to invest in private real estate investment. This is partly due to increased allocations by institutional investors and partly to strong performance in other asset classes, making it difficult for institutional investors to meet allocation targets with an ever-increasing denominator. Pension Real Estate Association's 2022 Investment Intention Survey indicates that the average targeted allocation is 10.3% versus the average current allocation of 8.9%. From early 2011 to August of 2021, the amount of dry powder targeting U.S. real estate has increased 139.2% (Preqin).

Staff believes higher interest rates will moderate today's market. Cap rate to interest rate spreads are below long-term averages for apartments and industrial while still above for retail and office. However, it is difficult to predict valuation returns given the interplay between rising interest rates and the need for large investors to invest billions of under-allocated dollars. It seems reasonable that momentum for appreciation returns will continue above long-term averages for the first quarter or two of fiscal 2023 and moderate thereafter.

While the underlying fundamentals of the real estate held in REITs are the same as private market real estate, public market REITs reprice daily and are inherently more volatile than the private market with values derived from appraisal values linked to recent market transactions. Following the calendar-to-date selloff (through May 12, 2022) which has seen the FTSE NAREIT Index down 17.02%, the go-forward multiples and implied capitalization rates look much more attractive for forward positive returns. REITs are now trading at an 8% discount to Net Asset Value (NAV) and in-line with historical funds from operations (FFO) multiples despite strong earnings growth. REIT earnings have generally been above consensus to start the year and the return to normal consumption is benefitting the "re-opening" sectors: retail, hotels, and office. The calendar-to-date selloff has acutely impacted the previously high-multiple sectors: storage, industrial, and apartments. Going forward it will be important to determine how long the re-opening momentum continues, and what valuation levels are appropriate for the higher multiple sectors given elevated interest rates and credit spreads.

The following table outlines the expected range of returns, based on property type, for transaction market pricing in fiscal 2023. Staff has lowered the initial yield expectations for industrial, office and apartment properties.

Staff expects investment market activity to continue to be strong through the first half of fiscal 2023 before declining in the second half and into fiscal 2024. There is still significant capital allocated for real estate, and from a historical perspective, the low interest rate environment still allows for yield spreads to real estate to be attractive on a relative basis. Competition for high quality assets continues and will be most robust for industrial and apartments, which will remain in favor for institutional investors. It is possible that there may be some transactions appropriately priced below these levels.

TRANSACTION MARKET PRICING EXPECTATIONS FOR FISCAL 2023

Property Type	Initial Yield*
Retail	4.00%–6.00%
Apartments	3.25%–5.25%
Industrial	3.00%–5.25%
Office	4.25%–5.50%

*Average annual 10-year holding period returns are expected to range from 1.00%–2.00% higher than the initial yield.

STRATEGY

Allocation

As of April 30, the real estate asset class is just under $9 billion. Including expected acquisitions, the asset class will finish fiscal 2022 slightly higher at $9.3 billion, up from $7.9 billion at the beginning of the fiscal year. This translates into a projected weighting for the asset class of 10.3% by the end of this fiscal year, based on May 6 market values. This is essentially at the 10% neutral allocation. This is up from 8.3% at the start of the fiscal year and is due to the decrease in equity asset values as well as the above trend appreciation of the portfolio and some new acquisitions.

Transaction activity was brisk through the current fiscal year. Staff evaluated the portfolio for disposition candidates, and by fiscal year end expected sales should total about $483 million. New investment is expected to end the year near $754 million. Portfolio debt was only marginally changed throughout the year.

Staff expects to see modest appreciation in fiscal 2023. If the other asset classes remain stable or grow per plan, and with the net of expected additions and dispositions to the real estate portfolio, the asset class will remain at or slightly under the targeted allocation in fiscal 2023.

Diversification

Public Investment (REITs)

The REIT portfolio is currently managed passively and is expected to be near its 15% neutral weighting for the remainder of the fiscal year. This portfolio will be transitioning in fiscal 2023 toward a more actively managed portfolio.

Private Investment

Geographic

As shown in the table below, through March 31, the direct portfolio is diversified across the four regions, although concentrated in a few large cities in each region. There was some transaction activity in fiscal 2022 thereby reducing the Midwest and East while increasing the allocation to the West region.

GEOGRAPHIC DIVERSIFICATION (CORE ONLY)
(as of March 31, 2022)

	STRS Ohio	STRS Ohio vs. NPI
East	34%	1.18X
Midwest	15%	2.06X
South	12%	.55X
West	39%	.92X

Staff has added significant investment in the East and the South regions since the March 31 date that will increase the allocation slightly to those regions. New markets in Nashville and Charlotte have been added after a recent target market study as discussed in the Fiscal 2022 Investment Plan. The portfolio will continue to focus portfolio holdings and acquisitions in major metropolitan markets across the country to provide for diversification — both geographic and economic. Major markets are emphasized, given the need to hold a mixed portfolio with critical mass to enable efficient asset management, as well as to benefit from the increased liquidity typically found in these markets. On a very select basis, additional markets may be considered for a particular property type.

Property Type

The table below details STRS Ohio's weightings in the four traditional property sectors, as well as the comparison to the benchmark. The industrial sector allocation increased nearly 8%, reducing all other sectors. Office allocation dropped 6% from this time last year.

PROPERTY TYPE DIVERSIFICATION (CORE ONLY)
(as of March 31, 2022)

	STRS Ohio	STRS Ohio vs. NPI
Apartment	20%	.74X
Industrial	30%	1.00X
Office	38%	1.36X
Retail	12%	.81X

STRS Ohio had apartment projects in the development process that stabilized this past year. However, allocation remained almost flat to last year. There has been a notable improvement in the leasing markets, and we expect some valuation improvements in the coming year. Staff believes the demographic drivers for apartments are back in place and will remain strong going forward.

The industrial sector is market weight relative to NPI; however, as a percentage of the portfolio, it is up eight percent. This is an abnormally high adjustment to a sector allocation in just a single year. This large adjustment is due to a 40% increase in value for the NPI (47% for STRS Ohio) and additional investment by STRS Ohio in the sector. This sector has been the most competitive over the last few years for new acquisitions and is even more so now. We expect development will be a primary way to access this highly competitive asset type.

Our largest benchmark overweight is with respect to the office sector, even though our internal weighting to office dropped six percent (to 38% from 44%) in the last year. We will continue to rotate out of investments that no longer fit in the portfolio to upgrade and diversify from either a locational or physical structure standpoint. Long office lease terms and credit tenancy fared well during the pandemic, and we expect the sector will have modest returns as we sort out hybrid work trends.

For retail investments, online sales actually decreased for the first time while brick and mortar stores increased their percentage of total retail sales reversing the trend that was exacerbated in the pandemic.

Dominant centers — particularly grocery-anchored shopping or necessity-based centers that have in-line tenants that are less exposed to online retailing — have done very well throughout the pandemic and provide relatively strong long-term returns. It is important to be very selective in the retail sector, as location and tenant line up are critical to success. Staff is satisfied with the underweight to this sector and have recently made opportunistic acquisitions in superior locations that experienced temporary pricing dislocations.

Property Life Cycle

Industrial and multifamily assets are still in high demand by investors, given the continued positive long-term outlook for the fundamentals in these sectors. This popularity puts pressure on yields that are now solidly in the low 3% range. This has caused staff to continue to consider making development an alternative route to access these property types at more attractive yields. Staff has employed this method and has been successful at implementing it over the past 25 years with risks mitigated and returns elevated. Therefore, staff will continue to monitor the investment market, and specifically, advantageous development opportunities.

Leverage

As of March 31, 2022, the leverage ratio is approximately 24%, down from 28.9% last year at this time. There is $150 million maturing in September of 2023. The above referenced leverage ratio includes STRS Ohio's $400 million portfolio loan. This interest-only loan matures in May of 2023. Staff expects no issues with regard to refinancing and will decide such based on allocation needs at that time and if the refinancing is accretive to the portfolio. Staff will manage the use of leverage in the direct portfolio below the policy limit of 50%.

International

The fiscal 2022 year-to-date return for the international portfolio is 12.9% as of the quarter ended March 31, 2022.

Overview

- $789.0 million market value
- 8.7% of total real estate
- $646.6 million in unfunded commitments
- 35 funds with 14 managers
  - 24 funds are actively managing their portfolios
  - 14 of these are investing; 10 are focused on asset management
- Geographic diversification:

– Europe	63%
– Asia	33%
– U.S. (via global funds)	3%
– Latin America	1%

Fiscal 2022 Activity

- A commitment to one European fund was made during fiscal 2022 for $83 million. One Asia fund has been approved for commitment for fiscal 2022 for an amount up to $100 million. These new funds will continue the strategy of focusing on major markets and the main property sectors in each of their regions. Approximately $500–$600 million of the unfunded commitments is expected to be invested or expire by fiscal year end 2025.
- Positive trendlines for valuations of industrial sector assets have accelerated, driven by COVID-19 dynamics and just-in-case delivery demands in both Europe and Asia. Strong demand for industrial space in Asia continues to reduce the time required for assets to stabilize, now often in as few as two years. Analysts estimate that every additional $1 billion in e-commerce sales requires an additional one million square feet of industrial space. In Europe, the demand created by e-commerce activity alone is expected to lead to 16% growth in absorption of industrial space over the next year.

  Office assets have shown resiliency in Europe. While occupancy has dropped since the beginning of the pandemic in some of the larger metropolitan areas, many tenants are seeking new quarters that afford higher levels of amenities and enhancement of sustainability features that meet heightened government regulations. Office attendance in Asian cities overall was less affected by the pandemic, and occupancy rates remained at 90% due largely to such constraints as size of homes and employer adversity to work from home.

  Multifamily rental properties in Asia continue to be in high demand, particularly in Japan, as occupancy rates have remained above 95% in Tokyo since 2016. The population continues to find major metropolitan areas attractive for their employment and education opportunities, fueling demand for this sector. Necessity-driven retail assets outperform offerings with high fashion content in both Europe and Asia. The hotel sector remains depressed throughout both regions.

- Transaction volume throughout Europe and Asia is recovering from the two-year decline caused by pandemic-related uncertainty in the markets. Deal volume in Europe rose 11% versus first quarter 2021, led by the United Kingdom, which gained 50% on a year prior — notably from a low base. High levels of capital continue to target real estate in both markets. For our commingled fund portfolio, fiscal year-to-date 2022 distributions increased from the first three quarters of the prior year by 22%, but were only 14% of NAV, still off pre-pandemic year averages of 20%–25% of NAV.
- Contributions as a percentage of unfunded commitments regained momentum, reaching 28%, well above the prior two-year contribution levels that attained approximately 18% of unfunded commitments in each of the two years. COVID-19 initially curtailed manager investing in 2020 and 2021, but investments resumed once managers (1) saw the value in allocating more capital to the positively impacted industrial sector and the demand-driven residential sector, (2) adjusted timing expectations for construction materials and project completions, and (3) began to pursue investments in other sectors once prices were sufficiently discounted to account for COVID-19.
- Spreads between entry yields/yields on cost and interest rates on borrowing continue to be favorable in Japan and the European Union. Neither region has indicated a hawkish stance to raising rates, although the European Central Bank has stated an intention of rate increases in the distant future above the current negative lending levels. Managers remain cautious in their use of debt, maintaining LTV levels at 50%–60% across their portfolios.

Life Cycle

- Early Stage — 14 funds — investing and early stage of managing assets — first three-to-four years

  The going-in basis achieved by the managers on these assets typically results in early gains, but a substantial portion of the increases in value occur in the later stages. This segment becomes the building block of future gains as the managers execute their business plans.

- Mid Stage — nine funds — managing assets & providing added value — second four years

  These assets should be a major driver of performance as the managers complete the business plans for each asset. The asset quality improves through value-add activities such as renovation, redevelopment or repositioning, and value increases are recognized. A majority of the best performing assets are sold during this period.

- Mature Stage — eight funds — selling stabilized assets — next three years

  Once assets enter this stage, usually 90% of the value increase has been recognized and liquidation within the next 6–24 months is expected. This segment will therefore generate only minimal appreciation but should generate cash flow (distributions).

- Obsolete Stage — four funds — less than 10% of market value in assets held longer than 96 months

  Not every asset in a fund meets its return objective. Assets in this stage often have failed business plans as managers await fundamentals to cycle back in their favor. These assets are typically disposed of when the funds meet their term limits (10–12 years) and extensions are not granted by LPs.

Returns as of March 31, 2022

- Fiscal year-to-date time-weighted returns (TWR): 12.90%
- Trailing five years TWR: 8.39%
- Trailing 10 years TWR: 10.39%
- Trailing 10-year returns still show a favorable 78bps margin over NPI despite five-year returns trailing NPI by 15bps. The fiscal 2022 returns continue to be negatively impacted by two primary

factors: (1) headwinds COVID-19 has had on the hotel and retail industries and (2) currency movements. Uplift to portfolio returns was provided by a heavy weighting (almost 50%) to the industrial and residential sectors in both Asia and Europe. With $650 million in "dry powder" available through recent fund commitments (approximately 45% of exposure), the portfolio is well positioned to take advantage of expected dislocations in international markets.

Regional Overview

In Europe, as in the United States, energy price increases and supply chain disruptions have dampened growth prospects. The Russian invasion of Ukraine has exacerbated these pressures. At the same time, Europe's services sector had started to show some gains from the reopening of the economy after COVID-19. United Kingdom GDP is projected to grow 3.7% in 2022, and the Euro area forecast was cut to 2.8% from 3.9%. The United Kingdom is facing inflationary stresses, with gas prices expected to increase further. Unemployment remains lower than that seen on the continent, at about 4%. Despite inflationary pressures, the European Central Bank (ECB) has indicated it will hold off on raising interest rates until "sometime after" ending their pandemic stimulus efforts later in calendar 2022, and any rate hikes will be from the negative levels now held (–0.5%). As of now, the ECB does not plan to shrink its balance sheet until the end of 2024. To soften economic pressures on the public, the €1.8 trillion financial package signed into action last year is still being disbursed, acting as support for the hardest hit countries. Government policies that cushion the real economy are likely to enable growth to pick up in the second half of fiscal 2023 and, depending on the ability of Germany in particular to shift energy import sources, economic growth may move back on track in later years that are within the investment period of several managers in our international real estate portfolio.

This backdrop puts European real estate managers in a position to take advantage of uncertainty in the markets. The best time to invest is when uncertainty leaves some investors out of the market and creates variable pricing of assets. National performance will vary, depending on each country's economic structure, positioning during the pandemic, and the degree of government fiscal support. Germany is taking steps to diversify its energy imports and forecast growth for calendar 2024 shows an uptick based on strategies being pursued. The economies of France, Spain and Italy are driven mainly by the services sector which is likely to suffer. Nordic countries have shown resilience through market downturns, due both to their diversified economies and their strong social safety nets. Expectations are that inflation will slow and growth hesitantly resume next year as the energy price shock wanes. All of the above factors create diversification benefits for allocations to European property sectors.

The Russian invasion of Ukraine is a major geopolitical event that will weigh on current and future macroeconomic developments across Europe. The impact on energy prices has already been felt, fueling inflationary tendencies that had been initiated by supply chain shortages. A downward trend of transaction volumes is expected in the coming months as a result of increasing uncertainty, and pricing will likely moderate as well.

Many of the Asia Pacific countries followed strict policies in response to the spread of COVID-19, initially limiting disruptions to economic activity. The zero-COVID-19 policies recently instituted by China have negatively impacted 2022 growth projections. However, inflation has been less severe across Asia than in other regions. In the fourth quarter of calendar 2021, Japan's real GDP had increased approximately 1% quarter on quarter. With the lifting of the pandemic-related state of emergency in October 2021, consumer spending and capital expenditure in the country gradually recovered. The government continued to support the jobs market, keeping unemployment low at 2.7%. In addition, the Bank of Japan is expected to continue its active QE policy to keep government bond yields low and maintain employment levels. South Korea's GDP increased 1.2% quarter over quarter in the fourth quarter of 2021, mainly driven by increased domestic consumption, eased quarantine measures, and the recovery of export activities in semiconductors and chemical products. The South Korean economy grew approximately 4% in 2021, recovering from an almost 1% contraction in 2020, and the Bank of Korea expects growth of 3.0% in 2022.

Real estate fundamentals have remained strong in Asia, particularly in industrial, where rent and occupancy growth have continued. E-commerce penetration rates in the region continue a steep upward trend. Industry estimates show three-to-four billion square meters of industrial space being required across Asia by 2025 to meet growing demand. Data centers registered strong growth in transaction volume during 2021. Across the region, office has also continued to demonstrate resilience, particularly in Japan, Korea, and select sub-markets in China. Although significant new supply of office space in Tokyo came online over the past two years, much of it was absorbed quickly, and vacancy remains low at 3%. Transaction volume for South Korea commercial real estate remained robust in 2021, up 14% from the previous year. The five-year growth rate for investment volume was supported by aggressive leasing activity, posting a 24% increase for office space and a 42% increase for industrial assets, driven primarily by increased appetite from domestic investors. For the first time, industrial products overtook the office sector as the preferred property type in South Korea in 2021. Despite the large increase in industrial supply in recent years, warehouse capacity per capita in South Korea remains one of the lowest among major Asian countries, leaving room for absorption of additional development projects slated to come online. Continued rental growth for this product is expected given the increasing cost of development and construction permit challenges.

Latin America comprises only 1% of the portfolio and new investments in this region are not being pursued.

Strategic Initiatives

The fiscal year 2023 focus will be on pursuing strategies that exploit market fragmentation that detaches asset pricing from the underlying fundamentals in targeted markets. This may arise from prior undermanagement of the asset or changes to market dynamics — such as technology advances or government-initiated sustainability requirements — that provide opportunities to upgrade an asset to higher standards. Such opportunities exist across Europe and Asia in (1) mispriced and mismanaged assets in Western European markets and in Japan, (2) buildings requiring upgrade to higher sustainability standards in Europe, (3) the industrial sector globally, (4) assets owned by corporations, governments and insurance companies in Japan, (5) bank NPL portfolios, and (6) China on a select basis in tier-one cities, with a focus on the industrial sector.

The principal guideline continues to be to invest in regions exhibiting compelling opportunistic factors with a focus on core markets that have stable governments and functioning financial markets. Real estate dynamics in these regions will allow for well-priced acquisitions and will show improving property fundamentals.

9. Alternative Investments

Asset Allocation

The alternative investments asset class is comprised of two portfolios: private equity and opportunistic/diversified. The most recent asset-liability study conducted in fiscal 2022 established a 19% neutral long-term alternative investments allocation target, including 9% private equity and 10% opportunistic/diversified. We estimate that the actual allocation to alternative investments will be above this level throughout fiscal 2023, but within the net rebalancing range of the asset class.

Alternative Investments Returns

For fiscal 2023, we forecast the total return for the alternative investments asset class to be at the 7.38% STRS Ohio policy return objective, projected within a 4.5%–8.5% range.

Commitment Pace

We anticipate new commitments of $1.5 billion to $2.5 billion across total alternative investments. This commitment pace is in line with the current long-term targeted neutral asset allocation. The range of projected commitments creates significant flexibility to address potential changes to allocation targets and long-term return targets.

Underwriting

Our investment underwriting will take into account the STRS Ohio economic forecast for the fiscal year. Our underwriting emphasizes managers that have generated returns in excess of both short-term and long-term benchmark performance and direct and co-investments with attractive projected risk-adjusted returns. Additionally, because the investment horizon of the asset class is longer than the annual investment plan forecast, we also target managers with a demonstrated ability to navigate past economic cycles, target direct and co-investments with demonstrated low- or non-cyclicality and we incorporate the possibility of future economic slowdowns into our underwriting.

Strategic Initiatives

We remain focused on building the direct and co-investment portfolio, and in fiscal 2022, we hired a new direct and co-investment professional, bringing the total number of dedicated professionals to four. Since inception through April 30, 2022, we have executed approximately 135 direct and co-investments, and direct and co-investment net asset value equaled more than $825 million as of April 30, 2022.

Additionally, we continue to execute on new strategic partnerships that we believe offer better fee economics, better governance and/or provide access to high-quality direct and co-investment deal flow. As of April 30, 2022, there were six strategic partnerships within the direct and co-investment theme totaling approximately $245 million in net asset value. As of April 30, 2022, there were 12 total strategic partnerships within multiple opportunistic/diversified themes (inclusive of the six in direct and co-investments) totaling more than $577 million in market value.

We also continue to refine and improve our processes for collecting and tracking fee-transparency-related information.

Private Equity

For fiscal 2023, we expect the one-year return for the private equity portfolio to be at the STRS Ohio policy return objective of 8.00% (net of fees), projected within a range of 5%–10% (net of fees).

PRIVATE EQUITY OUTLOOK

We expect our private equity portfolio performance to continue to track the movements of the public markets in the near term, including with respect to valuation headwinds caused by projected increases to the federal funds rate in response to high near-term inflation, the Russian invasion of Ukraine and the ongoing impact of COVID-19 on global trade.

Fiscal 2022 year-to-date distributions from private equity funds are equal to approximately 320% of contributions. We expect the pace of contributions to remain consistent during fiscal 2023 relative to fiscal 2022. We expect distributions to continue to outpace contributions in fiscal 2023, reflecting the impact of higher commitment volume in fiscal years 2018 and 2019 and lower commitment volume in fiscal years 2020 through 2022, but we expect the gross volume of distributions to decline relative to fiscal year 2022.

PRIVATE EQUITY STRATEGY

In last year's Annual Investment Plan, we forecasted committing $300 million to $600 million to private equity funds during fiscal 2022. Through April 30, 2022, we have made $602 million in total private equity commitments, consisting of (on a dollar-weighted basis) 84% domestic buyout funds and 16% venture capital funds, and we do not project additional private equity commitments through the end of fiscal 2022.

For fiscal 2023, we currently anticipate making new commitments to private equity of $400 million to $1.2 billion. We anticipate focusing new capital commitments on our highest performing private equity managers while selectively adding new managers with compelling track records and high expected returns. We maintain the flexibility to execute on attractive opportunities as they arise and, as a result, commitments may be below or modestly above this projected range. Factors that will influence our commitment strategy include the current overweight position of private equity relative to its neutral target allocation and potential opportunistic secondary sales or other means of active management, which remain tactical options for private equity portfolio management.

During fiscal 2023, we anticipate that the market value weightings of the portfolio categories in the following table will generally remain within the percentage ranges shown.

PRIVATE EQUITY PORTFOLIO (AS OF APRIL 30, 2022)

(in millions)

	Projected % of Total PE Market Value	Market Value	Projected Allocation Ranges for Fiscal 2023
Domestic Private Equity Funds	50%–60%	$ 5,454	65%–80%
Venture Capital Funds	25%–30%	$ 3,735	5%–15%
Global/International Private Equity Funds	15%–20%	$ 1,952	15%–25%
Public Private Equity	0%–2%	$ 0	N/A
Stock Distribution Portfolio	0%–2%	$ 0	N/A
TOTAL		**$ 11,140**	

Opportunistic/Diversified

For fiscal 2023, we forecast the one-year return for the opportunistic/diversified portfolio at the STRS Ohio policy return objective of 5.73% (net of fees), as determined in the fiscal 2022 asset-liability study, projected in a range of 4%–7% (net of fees).

OPPORTUNISTIC/DIVERSIFIED OUTLOOK

We believe opportunistic strategies have entered an attractive investment environment due to the economic uncertainty caused by COVID-19, the Russian invasion of Ukraine and projected hawkish Federal Reserve action. Market expectations for higher interest rates have led to a broad re-pricing of risk across public equity and credit markets. While not as intense or severe as the early days of the COVID-19 pandemic, certain sectors of the markets more sensitive to changes in long-term interest rates, such as technology, have been particularly challenged. Private credit markets, which primarily consist of floating-rate debt instruments, have seen overall yields increase in-line with risk-free rates, accompanied by modest widening in credit spreads. As a result, we anticipate focusing on special situations and specialty finance managers with unique sourcing capabilities and versatility to underwrite highly complex transactions, continuing to focus on direct lending managers with strong origination and credit track records, and targeting managers with the ability to partner with us on our strategic initiative regarding our direct and co-investment program.

OPPORTUNISTIC/DIVERSIFIED STRATEGY

In last year's Investment Plan, we projected new opportunistic/diversified commitments for fiscal 2022 of $1.0 billion to $2.0 billion. Through April 30, 2022, total opportunistic/diversified commitments were $1.9 billion, consisting of (on a dollar-weighted basis) 84% opportunistic funds and 16% direct and co-investments.

During fiscal 2023, we anticipate making new commitments to the opportunistic/diversified portfolio of $700 million to $1.3 billion. We expect such commitments to have a greater relative allocation toward opportunistic investments and direct and co-investments as the opportunity set within these strategies remains attractive. We will continue to utilize diligent underwriting and focus on strategies that offer downside protection, unique return sources and attractive relative risk-adjusted expected returns. During fiscal 2023, we anticipate that contributions to opportunistic/diversified investments will modestly exceed distributions.

- In fiscal 2023 we expect commitments of $300 million to $500 million to less liquid, longer-term opportunistic funds, which call capital over several years. This commitment amount is lower than the long-term commitment pacing trend, as the opportunistic/diversified portfolio is projected to meet its long-term neutral allocation in fiscal 2023 or fiscal 2024. We continue to seek attractive opportunities to re-invest distributed capital into new opportunistic commitments.

  In all opportunistic themes we anticipate allocating capital to our highest conviction managers in the existing portfolio and selectively adding new managers to diversify risk within each theme. We anticipate a keen focus on assets that are projected to generate returns that offer durability or countercyclicality in low macroeconomic growth or recessionary environments, and staff continues to search for strategies with attractive risk-adjusted returns relative to the other themes.

- We anticipate continuing to utilize diversified investments as a source of liquidity to fund new opportunistic fund commitments and direct and co-investments. We estimate net distribution activity in fiscal 2023 to approximate $15 million to $35 million from hedge funds. We will opportunistically explore new managers and strategies and make new commitments such that asset value remains neutral.

- We anticipate direct and co-investment commitments to range between $400 million to $800 million during fiscal 2023. Direct and co-investment commitment pacing will continue to be influenced by asset prices, credit spreads and overall private markets transaction volume. We will continue to take a disciplined approach to building a risk-adjusted portfolio where thematic performance is accretive to the overall opportunistic portfolio performance. We expect a majority of our co-investments will continue to be originated from existing manager relationships and strategic partnerships; however, we will continue to opportunistically invest with new managers that fit opportunistic/diversified strategic criteria and underwriting standards.

In opportunistic/diversified, investment activity falls within the nine separate themes referenced in the Portfolio Summary below, each of which is subject to the market value maximum set forth in the corresponding right-hand column. We expect the market value of each theme to be within its projected range, as set forth in the column immediately next to each theme. The market value of each theme is as of April 30, 2022.

Consistent with our opportunistic/diversified strategy, in fiscal 2023 we are decreasing our market value maximums for hedge funds to $350 million from $500 million and for energy and natural resources to $750 million from $1.0 billion, as the near-term opportunity sets for both are less attractive on a risk-adjusted basis relative to the other opportunistic/diversified themes. We are increasing the market value maximum of three themes, including direct and co-investments to $2.0 billion from $1.5 billion, banking, insurance and asset management to $1.75 billion from $1.5 billion and direct lending to $2.5 billion from $2.0 billion due to the attractive risk-adjusted returns within the near-term potential pipeline.

OPPORTUNISTIC/DIVERSIFIED PORTFOLIO (AS OF APRIL 30, 2022)

(in millions)

Theme	Projected % of Total OD Market Value	$ Market Value	$ Market Value Maximum
Banking, Insurance and Asset Management	10%–20%	$ 1,293	$ 1,750
Direct and Co-Investments	5%–25%	$ 835	$ 2,000
Direct Lending	15%–25%	$ 1,597	$ 2,500
Energy & Natural Resources	0%–5%	$ 412	$ 750
Hedge Funds	0%–5%	$ 221	$ 350
Infrastructure	0%–5%	$ 55	$ 250
Liquid Alternatives	5%–25%	$ 905	$ 2,000
Public-Private Investment Funds	0%–5%	$ 2	$ 100
Specialty Finance	25%–40%	$ 2,960	$ 4,000
Total		**$ 8,280**	**$13,700**